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H. M. SUTER, Editor

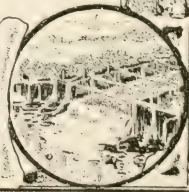
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Congressional inspection party at the mouth of the Gunnison Tunnel, Colorado, now 7,000 feet within the mountain. One of the most interesting engineering projects the Reclamation Service is engaged upon.

Forestry and Irrigation.

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JANUARY, 1906.

No. 1

NEWS AND NOTES

The Annual Meeting

The meeting of the American Forestry Association, held in Washington, D. C., January 16 and 17, was one of the most important yet held. The reports by the Board of Directors and the Treasurer showed a splendid growth of the Association during the past year, and much business of importance was transacted at the three sessions. This number of FORESTRY AND IRRIGATION contains the complete proceedings of the meeting, including reports of the Directors, Treasurer, revised by-laws, papers read, and resolutions passed.

Canadian Forestry Meeting

Mr. Gifford Pinchot, Forester, U. S. Forest Service, returned to Washington in time for the annual meeting of the American Forestry Association, after a trip to Canada, where he attended the meeting of the Canadian Forestry Convention at Ottawa on the 10th, 11th, and 12th. Mr. Pinchot addressed the convention on the 10th, his subject being "The United States Forest Service." Previous to this, on January 8, Mr. Pinchot was the principal speaker at a luncheon given by the Canadian Club of Toronto, when he spoke on "American Forestry."

The Canadian Forestry Association, under whose auspices the convention was held, is greatly interested in American forestry. A very large number are members of the American Forestry Association, and have attended many of its meetings and contributed valuable information in addresses and papers. Mr. Pinchot was warmly received, both at the convention and at

Toronto. The convention was the greatest and most representative gathering of its nature that has ever been held in the Dominion, in many respects equalling the very remarkable American Forest Congress held under the auspices of the American Forestry Association last year.

Meeting of Ohio Association

The Ohio State Forestry Association held a very successful meeting in Columbus on January 9 and 10. The State Horticultural Societies, State Farmers' Institute, and Board of Agriculture met in Columbus at the same time, and the Ohio Forestry Association convention was attended by a large number of the members of each of these organizations and a good attendance of its members. The program of the meeting was as follows: First session, Tuesday evening, January 9, at Townsend Hall, Ohio State University: Address by the president, Prof. William R. Lazenby; paper, "The Trees We Might Have and Do Not," by L. B. Pierce; paper, "How to Get Farmers Interested in Forestry," by H. C. Rogers; paper, "Practical Forestry From Actual Experience," by William Hanna; paper, "Some Reasons for Saving, Improving, and Replanting Forests in Ohio," by Prof. William R. Lazenby. Second session, Wednesday evening, at Board of Trade Auditorium: Forestry addresses by W. W. Farnsworth, president of the State Horticultural Society, and Dr. W. O. Thompson, president Ohio State University; address, "What Morrow County is Doing Along Forestry Lines," by Horatio Markley, secretary Morrow County Forestry Association;

paper, "Windbreaks," by Prof. W. J. Green, horticulturist Ohio Experiment Station. The session on Thursday morning was devoted to association business. After each of the addresses and papers at all sessions discussion was invited and some interesting facts were elicited.

In addition to the interesting sessions of the association, the Ohio State University had on exhibition sections of some of the more important forest trees of Ohio, and the Morrow County Forestry Association exhibited some trees and sections of trees of locust and catalpa, showing annual increment and height growth. In connection with the meeting of the Ohio Forestry Association, at the meetings of the various other societies in session at the same time many other addresses on forestry were given.

The meeting was an undoubted success and much interest was manifested in forestry. The Ohio association is still a young one, but it is rapidly increasing in membership and influence, and has before it an interesting and broad field of activity.

Report of Massachusetts Society

The report of the secretary of the Massachusetts Forestry Association, Mr. Edwin A. Start, read at the annual meeting of the association, held in Boston December 14, and published in the December number of *Woodland and Roadside*, is interesting, and gratifying, inasmuch as it shows a healthy and growing interest in forestry in New England. The Massachusetts Forestry Association has now 735 members, being, in point of size, the largest of the state forestry organizations, with the exception of the Pennsylvania Forestry Association, which is double the age of the Massachusetts society.

Mr. Start, in the first portion of his report, details the work accomplished by the association during the past year, and makes recommendations looking to the broadening of the work of the organization. The second part of the report is an interesting review of Mas-

sachusetts forestry during the past year. Mr. Start concludes his report as follows: "Today it is not necessary, as it has been, to apologize when we wish to talk forestry in Massachusetts. Rather must we be ready with the facts that are sure to be called for by eager questioners. Nothing can be more encouraging for the future than this, and while it proves what has been done, it points the way to new and larger things."

In the light of the recent co-operative work of the American Forestry Association and the Massachusetts Forestry Association looking to the creation of forest reserves in the White Mountains of New Hampshire and the Southern Appalachian Mountains, this report is unusually gratifying.

Forest Legislation Advocated

At the Rivers and Harbors Congress, held at the New Willard Hotel, in Washington, at the same time as the meeting of the American Forestry Association, the following resolution was unanimously adopted:

"Whereas, the National Rivers and Harbors Congress, while advocating liberal expenditures for improving the harbors and waterways of our great country, remembers that an ounce of prevention is worth a pound of cure, and that the greatest natural factor in conserving what God has given us is the legitimate preservation of our forests,

"Resolved, That it advocates appropriate forestry legislation by the National Congress and adequate government expenditure in furtherance of protection of our rivers—great factors in building up our manufactures, in protecting the interests of agriculture, and in silently and cheaply conveying to its ultimate market the enormous products of the mine, the soil, and the factory, with which our country is blessed."

The question of the effect of silt washed down from the forest-denuded headwaters of streams, upon the clogging-up of the rivers and harbors of

the United States, is one which, although appreciated for some time past, has not been given the prominence which its importance warrants.

Southern Forestry An agent of the Forest Service started on a trip January 20 for the purpose of superintending the examination of forest tracts aggregating over a million acres in the southeastern states. He goes in response to applications received from owners who desire to introduce conservative management on their forest lands. Of these lands, 702,000 acres are in Florida, 252,000 in Missouri, 38,000 in Louisiana, 23,500 in Mississippi, and 7,000 in Texas.

In addition to these preliminary examinations, work will be begun to bring under conservative management a forest of 70,000 acres in Arkansas. Since the Forest Service has previously prepared a working plan for a tract of 100,000 acres at Pine Bluff, Ark., and other co-operative plans have been requested in the same state for 20,000 acres more, the total acreage in the southeast for which advice has been sought from the Forest Service now amounts to about a million and a quarter acres.

Work on Shoshone Project With the exception of the engineering work necessary in connection with the construction of the Shoshone dam and Corbett tunnel in northern Wyoming, no field work was done in December on the Shoshone project.

Cross sections of the canyon have been extended to develop accurately the topography for construction purposes. The final adjustment of the outlet tunnel alignment has been made and the topography up stream worked out. At the Corbett tunnel, levels have been run and the entire tunnel line measured and checked for the purpose of determining grades. The lines and grades of the sluicing tunnel have been established and marked on the ground. The site of the lower portal of the main tunnel and that of the upper por-

tal of the sluicing tunnel were cross-sectioned and about two-thirds of the angles necessary for the alignment of the tunnel accurately measured.

During the past month the weather in the canyon was cold and windy, which retarded the work somewhat. The contractors' camp, with accommodations for about 100 men and 20 horses, is completed, and work on the outlet tunnel is in progress. The rock appears to be exceptionally hard to drill and breaks out with difficulty, requiring the use of 60 per cent dynamite. A large boiler has been installed at the upper end of the tunnel, and the boiler capacity at the lower end will be immediately doubled, thus materially increasing the rate of progress. Two daily shifts of ten hours each have been occupied on the outlet tunnel and the contractor has been notified that he must proceed to employ three daily shifts of eight hours each. Four thousand cubic yards of the excavation for temporary flume and dam were finished during the month, and about 2,400 linear feet of cottonwood logs were delivered for use in temporary construction; about 85 men and 32 horses are employed at this point. During the present month it is expected that the cableway will be in operation at the dam site.

To Plant Canary Pine

The Forest Service has recently placed an order with a firm in the Canary Islands for ten pounds of the seed of Canary pine, *Pinus canariensis*. This seed will be used in experimental planting in the forest nurseries in southern California, where hardy, rapid-growing conifers are needed for planting on the semi-arid mountains. This pine is said to endure long periods of drought and to grow well on the mountains as high as the snow line. The wood resembles our common pitch or Georgia pines, and apparently is very strong and durable. Two tons of this seed were exported to Europe last year, where large plantations of this tree are being made.



Tempe, Arizona, showing how irrigation transforms the desert.



A western town in an irrigated region. Cody, Wyoming. Developed by Buffalo Bill (Col. Wm. F. Cody.)

**Resignation
of Mr.
Anderson**

The resignation of Mr. A. A. Anderson as superintendent of the Yellowstone Forest Reserve, which takes effect March 1, is fully explained in his letter to Mr. Gifford Pinchot, chief of the Forest Service, and the latter's reply. Mr. Anderson filled a difficult position in a very satisfactory manner, and it is with regret that we note his withdrawal from active service in forestry. The letters are as follows:

80 West 40th Street,

New York City, Dec. 28, 1905.

My dear Mr. Pinchot:

On my return from Wyoming last autumn, I asked for a furlough until the coming spring.

I now fear that it will be impossible for me to resume my accustomed field work at that time. Some four years ago, at your request, I took up forestry work, and since then have given almost my entire time to my duties as forestry officer. This has necessitated the neglect of my private interests, my art, etc., and as the field work required my presence upon the reserve during five or six months of each year, I have during those periods necessarily been separated from my family. As my wife's health is in such a condition as to require treatment abroad, I do not consider the present condition of the Yellowstone Forest Reserve necessitates a further sacrifice of this nature.

The reserve has been extended, its boundaries definitely settled, its patrol service fully organized, and the creation of a game preserve south of the park insures protection to the large game of that region. But what is of far more importance—the transfer of the Forestry Bureau to the Agricultural Department—has been effected (to which end, as you know, I strenuously labored), thereby placing all forestry matters in your able hands.

Owing to the fact of the recent marriage of our only child, I find it quite imperative that I should accompany my wife to Europe the coming summer, as my daughter, having taken up

her residence in California, will be unable to go abroad with her mother.

In view of these facts, and with sincere regret at being obliged to discontinue the congenial work in connection with yourself by severing my relations with the forestry department, and feeling that I should give you timely notice of my intentions, I hereby place my resignation in your hands, to be acted upon at your convenience.

Yours very truly,

(Signed) A. A. ANDERSON.

HON. GIFFORD PINCHOT, Forester,
Washington, D. C.

To this letter Mr. Pinchot made the following reply:

Washington, January 2, 1906.

MR. A. A. ANDERSON,

80 West 40th St., New York, N. Y.

My dear Mr. Anderson:

On my return to Washington I find your letter of December 28, in which you tender your resignation. During the four years of your work in forestry you have, as you justly observe, given up almost your entire time to that work, and you add that Mrs. Anderson's health, and your daughter's marriage, will make it necessary for you to go abroad for the coming summer.

First of all, I want to express my great appreciation of the personal sacrifice you have made in order to do your forest work, and of the service you have rendered to the Yellowstone Forest Reserve, and hence to the people of Wyoming who live in its neighborhood. Two years ago I had occasion personally to investigate the complaints made against your administration of the reserve, and to learn something from my own observation both of the puerile and often unconfessed reasons which lay behind so many of the complaints, and of the high character of the force of supervisors and rangers which you had organized. The whole reserve is in immensely better condition than it was when you took hold of it, and it gives me great pleasure to testify to that fact.

Since you were furloughed, at your own request, on returning from the

field at the end of last summer's work, and since you do not propose to re-enter active service, it does not matter when your resignation takes effect. Some date, however, must be fixed for the sake of the record, and I shall accordingly recommend to the Secretary of Agriculture the acceptance of your resignation to take effect upon the 1st of March.

With high appreciation of the good hard work you have done (hard work

purchase of 25,000 acres of land in Atlantic county and the establishing thereon, and occupying the whole tract, of a forest reservation according to the ideas of Governor Stokes as embraced in the law passed last winter creating the board and providing for such reservations.

The proposition is modified somewhat by the present owners, who will present to the board an opportunity of purchasing the tract at a very reason-



Shoshone Dam Site. Highest dam in the world; to be built at this point by U. S. Reclamation Service. Dimensions: 310 feet high, 85 feet long at bottom, 200 feet at top.

which has been to you a source of expense, not of revenue), and with all good wishes for the future, believe me,

Very sincerely yours,
(Signed) GIFFORD PINCHOT,
Forester.

Forest Reservation in New Jersey
The New Jersey State Board of Forest Park Reservation Commissioners
is considering a proposition for the

able figure. It is made up of good forest land and also contains fine water power. Two offers have been made to the board, one to purchase the lands in their entirety, the other to acquire it minus the water power. The price would be made less under the latter proposition. According to the report of the state geologist upon the water supply, this water power could be made to develop 500 horse power.

There are several reasons, the board considers, why it would be best for the state to purchase the tract including the water power.

If the tract is acquired by the state, the board would follow the directions of the law and "Put in operation the best method to reforest cut-over and denuded lands, to forest waste and other lands, to prevent injury of forests by fire, the administering of and care of forests on forestry principles, the encouraging of private owners in preserving and growing timber * * * and the general conservation of forest tracts."

To acquire the 25,000 acres and establish the reservation will require a much larger sum than the \$14,000 already appropriated for the use of the board, and it is believed the board therefore will ask the legislature this winter for a special appropriation to meet the situation. It is understood that the sum asked will approximate \$125,000.

The forestry commissioners have accepted the deed of 104 acres of land in Atlantic county which were presented to the board by Dr. John Gifford, of Princeton, formerly a professor in the New York State College of Forestry at Cornell University, Ithaca, N. Y., and Mrs. Gifford. This tract is near Mays Landing along the Great Egg Harbor River.

The commissioners have also consummated the purchase of 268 acres adjoining the Gifford tract from the Mays Landing Water Power Company. Another tract purchased is one of 597 acres in Burlington county. This was bought from Charles W. Matthews, of Tuckerton. The commissioners are duly in possession of these tracts, and the forestry work will be commenced at once.

St. Mary's Project

The Secretary of the Interior, on January 17, granted authority to the Reclamation Service to draw specifications and advertise for bids for the

construction of the canal from St. Mary River to the North Fork of Milk River, the estimated cost of which is \$900,000.

Owing to international features involved, the importance of the interests of the United States, and the necessity of preserving its status in relation to these waters, it is deemed essential that the work should be pursued with diligence, to offset the claims which Canada may in future advance.

Canal Tree Planting

A municipal corporation of Chicago, owning over six thousand acres of land along the canal from Chicago to Joliet, Ill., has applied to the Forest Service for advice as to planting about four thousand acres of this tract to forest trees, with a view to securing revenue from property which is at present unproductive. An agent of the service will visit the tract as early as possible to study planting possibilities.

Statistics of Forest Products

Extremely valuable results are expected from the gathering of statistics of forest products which the Forest Service has now under full swing. The design is to secure accurate figures covering the past year, and to publish these in a statement which will be the first of an annual series. The question cards to be filled in by wood manufacturers throughout the country are now being distributed at the rate of about a thousand a day. The total number of these cards will exceed 25,000. The lumber trade journals and the journals of wood products have expressed hearty appreciation of this work, and a number of manufacturers' associations have tendered their efforts in co-operation with the Forest Service. A great deal of interest attaches to the difficult task, and the definite need of which has long been felt for precise published information on forest products at more frequent intervals than census years promises in large measure to be satisfied in this way.



The Roosevelt Road, leading from Phoenix, Mesa and Tempe, Arizona, to the Roosevelt Dam (Salt River Project). This road is 62 miles in length, over 40 of which extend through the Canyon of the Salt River. The road was built by the U. S. Reclamation Service and the three towns mentioned contributed \$75,000 of its cost. A remarkable feature of its construction was the fact that the day labor was performed by Apache Indians, remnants of the mighty Geronimo's former band; a tremendous step in civilization this marks in turning these Indians from terrorizing the country to actually assisting in its development.

MEETING OF THE AMERICAN FORESTRY ASSOCIATION

Held at Washington, D. C., January 16 and 17.

Much Important Business Transacted.

WHILE not approaching in magnitude the Forest Congress of last January, the meeting of the American Forestry Association held at Washington on January 16 and 17 was a notable one in every respect. The attendance was large for a business meeting and of the most active members of the Association—those who plan and carry forward the forest work this Association stands for. That there is a rapidly increasing interest in forestry was amply demonstrated by the large number of public men who either appeared at the meeting or forwarded messages expressing their appreciation and support of forestry.

The opening meeting, on Tuesday, January 16, was called to order by President Wilson at 10:30, in the sitting room of the New Willard Hotel. Secretary Wilson's address, as president of the American Forestry Association, was an especially happy one. He traced the growth and broadening of the forest movement from its beginning and was emphatic in his prediction of the early recognition by all citizens of the importance of the forest movement, and its extension and adoption in all sections. Following the president's address, Mr. H. M. Suter, secretary of the Association, read the annual report of the Board of Directors (printed in full elsewhere in this number). This report, together with that of the treasurer, following shortly after, showed that the Association is in excellent condition financially; and, in accepting the two reports, several members took occasion to express their gratification not only of the thriving condition of the organization, but of the amount of work carried forward during the fiscal year of 1905.

The chair then appointed the following committees:

Committee on Resolutions—Mr. Pinchot (chairman), Mr. Harvey, and Mr. Ayres.

Committee on Audit—Captain J. B. Adams (chairman), and Mr. George P. Whittlesey.

Committee on Revision of By-laws—Mr. Hall (chairman), Mr. Cutler, Mr. Start, Mr. Harvey, and Mr. Herbert Smith.

Committee on Nominations—Mr. Hall (chairman) and Colonel Fox.

Committee on Affiliation—Mr. Cutler (chairman), Mr. Gaskill, Mr. Start, Mr. Lippincott, and Mr. A. G. Forbes.

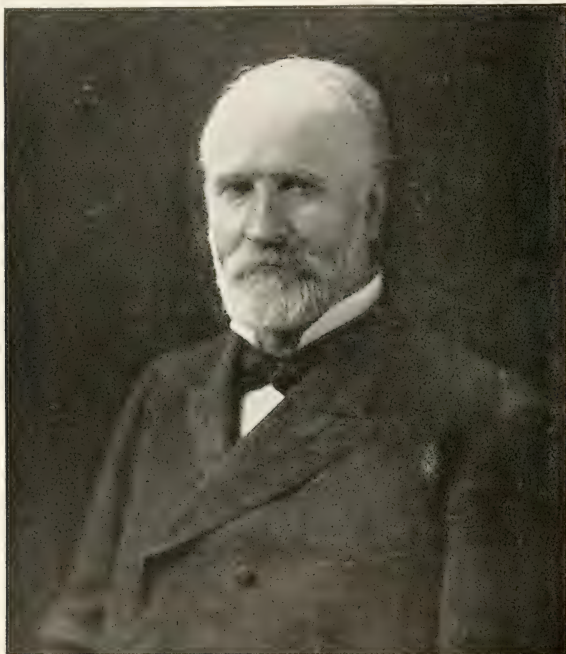
Committee on Forest Reserve Bill—Mr. Woodruff (chairman), Mr. Cutler, Mr. Harvey, Mr. Ayres, and Mr. Elliott.

Dr. Edward Everett Hale, chaplain of the Senate, was then called upon for a short address, and responded in excellent spirit, particularly urging upon all public-spirited citizens consideration of the proposed White Mountain and Appalachian Forest Reserves, and earnestly advocating their creation by the passage of the various measures now before Congress.

Mr. Bainbridge, chairman of the committee of the New York Manufacturers' Association for the revision of the second-class postal laws, was introduced to the meeting by Mr. W. S. Harvey, whom Secretary Wilson called to the chair when forced to attend a Cabinet meeting. Mr. Bainbridge explained the abuse of the second-class rate by publishers, and expressed the conviction that a curtailing of this privilege would save a vast amount of pulp paper, and thus in a measure lessen the demand for pulpwood.

The chair then called on Mr. S. B. Elliott, of the Pennsylvania Reservation Commission, for an address. Mr. Elliott explained in an interesting manner the progress Pennsylvania has made in protecting and extending her forests, and urged the extension of the forest reserve idea. Mr. Robert C. Lippincott, of Philadelphia, formerly

forcibly, that the movement would have their strong support. He cited clearly the situation in Pennsylvania, and gave the reasons why the general lumber trade has delayed in accepting forestry. Now that the practical business value of forestry to the lumberman is known, the more progressive and far-seeing members of the trade



HON. JAMES WILSON

Secretary of Agriculture, recently elected for the ninth successive time President of the American Forestry Association.

president of the National Lumber Manufacturers' Association, then spoke on the interest of the lumber trade in forestry. He denied that the progressive lumbermen of today were antagonistic to forestry, and stated his conviction that if the practical value of scientific treatment of timberlands could be brought to their attention

have accepted the offer of advice made by the Forest Service, and are practicing forestry on their lands.

Mr. Edwin A. Start, secretary of the Massachusetts Forestry Association, then spoke, particularly on the forest situation in New England. Mr. Geo. K. Smith, secretary of the National Lumber Manufacturers' Association,

was then called upon. He dwelt particularly on the importance of the effort which the Forest Service is now making in connection with the association which he represents to collect all available statistics relating to timber supply and consumption. Senator J. H. Stout, of Wisconsin, then made a brief address to the meeting, expressing his interest and appreciation of forestry. The meeting then adjourned.

The program for the afternoon session, which convened at 2:30 on the same day, included discussion of the forest and water problems of the United States. Authoritative addresses were given by Mr. Arthur P. Davis, assistant chief of the United States Reclamation Service; Mr. Morris Bien, consulting engineer of the United States Reclamation Service, and Mr. C. J. Blanchard, statistician, United States Reclamation Service. Mr. C. D. Haskins, a well-known engineer of the General Electric Company, was prevented by sickness from being present at the meeting, but his paper was read by request of the presiding officer, Mr. Pinchot, by Mr. James H. Cutler. The paper was an interesting non-technical discussion of the vital importance of protecting the water powers of the South by protecting the forests of that region. Mr. Henry A. Pressey, formerly connected with the United States Geological Survey, and an authority on the conditions in the Southern Appalachian Mountains, next presented a paper, with an interesting exposition of the resources of that region and its vast stored potential power.

This finished the set program for the afternoon, and the remainder of the session was devoted to impromptu addresses. Mr. G. O. Shields, president of the League of American Sportsmen, spoke on the relation that protection of the forests has on the protection of game; Mr. R. C. Lippincott was heard again in an interesting address, and Prof. Henry S. Graves, director of the Yale Forest School, spoke briefly.

In the evening, a reception was tendered in honor of the members and officers of the Association by Mr. and Mrs. James W. Pinchot and Mr. Gifford Pinchot, at their home at 1615 Rhode Island avenue.

Wednesday morning, the Association convened at 10:30, with Mr. Wm. S. Harvey presiding. Ex-Gov. F. W. Rollins, of New Hampshire, was unable to be present at the meeting, and his paper was read by Mr. Philip W. Ayres. The secretary then read a letter from Senator J. H. Gallinger, of New Hampshire, who was unfortunately prevented from being present. Senator Gallinger expressed his interest in the work the Association is advancing in regard to the creation of national forest reserves in the White Mountains and the Southern Appalachian Mountains, and pledged his support to the movement. The secretary also read a paper prepared by Prof. Samuel B. Green, of the University of Minnesota, on education in forestry. Capt. J. P. Walker, U. S. A. (retired), then spoke briefly on the relation between destruction of the forests and the injury to the rivers and harbors of the United States. The chair then called on Judge Warren Higley, of New York. It was in Judge Higley's law office in Cincinnati that the American Forestry Association had its first inception, some thirty years ago, through the enthusiastic work of a few public-spirited citizens. Judge Higley's talk was largely reminiscent, and he dwelt at length on the change in sentiment toward forestry which has come about since the organization of the Association.

Mr. George H. Moses, secretary of the New Hampshire Forestry Commission, then spoke briefly on New Hampshire forest conditions. In the absence of Dr. George T. Winston, president of the Agricultural and Mechanical College of North Carolina, his address was read by Mr. James H. Cutler. The paper was in the form of a summary of reasons for the estab-

lishment of a forest reserve in the Southern Appalachian Reserve, and a plea for education in forestry in the schools and colleges.

Mr. L. L. Gilbert, secretary of the Alabama Commercial and Industrial Association, at Montgomery, was next called upon. He responded in a brief address, defining the forest needs of the South, and particularly of Alabama.

The chair then asked for the report of the committees. Mr. Cutler, chairman of the Committee on Affiliation, reported that it had been found practicable and necessary for his committee to confer with the Committee on By-laws, since the plan of affiliation proposed involved many changes of the by-laws. The committee recommended the appointment by the Board of Directors of a committee of five, who were to consider the question of affiliation with local and state societies in all its phases, and be ready to propose a plan at the next annual meeting of the Association. The report was unanimously adopted.

The report of the Committee on Revision of By-laws was presented by Mr. William L. Hall, as chairman. The committee recommended numerous changes, which, after some discussion, were adopted, with minor amendments.

Mr. George P. Whittlesey, acting for Captain J. B. Adams, chairman of the Audit Committee, reported that that committee had carefully audited the accounts of the treasurer, found the same correct, and recommended the adoption of his report.

The report of the Committee on Forest Reserve Bills was presented by Mr. George B. Woodruff. Mr. Woodruff read a bill prepared by his committee for introduction in Congress. This bill embodies all of the four individual measures which have been introduced by Messrs. Gallinger, Brownlow, Overman, and Currier. The report of this committee was unanimously adopted.

The report of the Committee on Nominations was made by Mr. William L. Hall, in place of the chairman, Professor Graves. The nominations were presented to the meeting, and all elected by ballot. The new officers are: President, Hon. James Wilson (re-elected); vice-presidents at large (under new by-laws), James W. Pinchot, F. E. Weyerhaeuser, Dr. Edward Everett Hale, John L. Kaul, Dr. B. E. Fernow; treasurer, Otto Luebker; Board of Directors (under new by-laws), Hon. James Wilson, Ex-Governor N. J. Bachelder, Rutherford P. Hayes, George P. Whittlesey, Gifford Pinchot, F. H. Newell, George K. Smith, Allan Chamberlain, William S. Harvey, James H. Cutler, Prof. Henry S. Graves, Dr. Albert Shaw, William L. Hall, Samuel Spencer, and H. A. Pressey.

The Committee on Resolutions then made its report, Mr. Suter presenting the same in place of its chairman, Mr. Ayres. All of the resolutions recommended by the committee were unanimously adopted by the meeting.

There being no further business before the Association, the meeting then adjourned *sine die*.

REPORT OF COMMITTEE ON FOREST RESERVE BILL.

The Committee on Forest Reserve Bills reported that it had considered the bills for creating the Appalachian and the White Mountain Forest Reserves, now before Congress, as introduced by Senators Gallinger and Overman, and Representatives Brownlow and Currier, respectively, and, with very slight modifications, amalgamated those bills into one entitled "A Bill for the Purchase of Two National Forest Reserves in the Appalachian Mountains and the White Mountains, to be Known as the Appalachian Forest Reserve and the White Mountain Forest Reserve, respectively."

The committee offered to the Association this amalgamated bill and recommended that the congressmen who introduced the four individual bills

join to influence the Senate and House committees before which the respective individual bills are pending, in introducing the amalgamated bill before Congress. The bill is as follows:

59th Congress,

1st Session.

A BILL

FOR THE PURCHASE OF TWO NATIONAL FOREST RESERVES IN THE APPALACHIAN MOUNTAINS AND WHITE MOUNTAINS, TO BE KNOWN AS THE APPALACHIAN FOREST RESERVE AND WHITE MOUNTAIN FOREST RESERVE, RESPECTIVELY.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Secretary of Agriculture is hereby authorized and directed, in his discretion, to acquire by purchase or condemnation lands suited to national forest reserve purposes in the Appalachian Mountains within the States of Maryland, West Virginia, Virginia, North Carolina, South Carolina, Georgia, Alabama, and Tennessee, and the White Mountains in the State of New Hampshire, to be known as the Appalachian Forest Reserve and the White Mountain Forest Reserve, respectively, and to care for, protect, use, and make accessible the said reserves under the laws governing national forest reserves.

Sec. 2. That the Secretary of Agriculture shall advertise in the several states named in this act for lands to be purchased under the provisions hereof; and as between lands of equal value, for the purposes of this act, the lowest bids shall be accepted: *Provided*, that the Secretary of Agriculture shall have the right to reject any or all bids: *Provided further*, that the Secretary of Agriculture is hereby authorized and empowered, in his discretion, to contract for the purchase of lands, exclusive of the timber thereon of kinds and sizes to be specified in the contract, said timber to be cut

and removed in accordance with rules and regulations to be prescribed by him for that purpose; and *Provided further*, that the Secretary of Agriculture is hereby authorized and empowered, in his discretion, to contract for the purchase of lands, exclusive of the mineral rights therein; and on such lands mineral deposits may be mined under such rules and regulations as the Secretary of Agriculture may prescribe, and the rules and regulations, as provided in this section for cutting and removal of timber and mining of minerals, shall be embodied in the contract for purchase and conveyance of title.

Sec. 3. That in the acquirement of lands for the purposes of this act the Secretary of Agriculture shall, in each of the several states named herein, conform to the conditions prescribed in the present or future act or acts of the legislature of each such state ceding to the United States the right to acquire and control such lands, and the Secretary of Agriculture is hereby authorized and empowered to exercise, as to such lands, all the rights and powers granted in said act or acts: *Provided*, that when the owners of lands sought to be acquired for the purposes of this act are unwilling to sell the same on terms satisfactory to the Secretary of Agriculture, condemnation proceedings for the acquirement of such lands shall not be had so long as the said owners protect and perpetuate the forests on said lands, under such regulations as may be prescribed by the Secretary of Agriculture for the control of the forests on lands purchased by the government under this act, so far as the same may be applicable.

Sec. 4. That the Secretary of Agriculture is hereby authorized and empowered to accept gifts of land for the purposes of this act, and such lands shall thereafter be known by such names as the donors, with the approval of the Secretary of Agriculture, may prescribe.

Sec. 5. That the Secretary of Agriculture may do all things necessary to secure the safe title in the United States to the lands herein provided to be purchased or otherwise acquired; but no payment shall be made for any land purchased or otherwise acquired under this act until the title to such land shall be satisfactory to the Attorney General and shall be vested in the United States and accepted, and when vested as aforesaid the land thus transferred shall become and be administered as national forest reserve land.

Sec. 6. That the Secretary of Agriculture shall as far as practicable make provision for the reforestation of clearings on lands acquired under the provisions of this act whenever he shall consider such action necessary for the protection of the soil or the water supply.

Sec. 7. That the Secretary of Agriculture is hereby authorized and empowered to make contracts for the purchase of lands and accept conveyance thereof or otherwise acquire the same in accordance with the provisions of this act to the amount of not to exceed three million dollars, which sum shall be available immediately and until expended and is hereby appropriated to carry out the provisions of this act out of any moneys in the Treasury not otherwise appropriated: *Provided*, that the Secretary of Agriculture shall each year make a detailed report to Congress of his doings in the premises: *And provided*, that no part of said sum hereby appropriated shall be expended for the purchase of lands under the provisions of this act until a valid title to the same shall be vested in the United States, and until the state in which the land lies shall have ceded to the United States exclusive jurisdiction of the same, during the time the United States shall be or remain the owner thereof, for all purposes except the administration of the criminal laws of said state and the service of any civil process therein.

REPORT OF THE COMMITTEE ON AFFILIATION.

The Committee on Affiliation, through its chairman, Mr. Cutler, reported that, on discussing this matter in committee, it was found that joint action with the Committee on By-laws was necessary, hence asked that the chairman of that committee be allowed to report for both committees, so far as immediate action was concerned. The committee further recommended that the Association sanction a selection by the Board of Directors of a committee of five, with instructions to report at the next annual meeting of the Association what action in the line of closer affiliation they would then recommend. This, on motion, was adopted.

THE AMERICAN FORESTRY ASSOCIATION

BY-LAWS.

(Revised January 17, 1906.)

ARTICLE I.

Name.

The name of this Association shall be "The American Forestry Association."

ARTICLE II.

Objects.

The objects of this Association shall be the discussion of subjects relating to tree planting, the conservation, management, and renewal of forests, and the climatic and other influences that affect their welfare; the collection of forest statistics and the advancement of educational, legislative, or other measures tending to the promotion of these objects. It shall especially endeavor to centralize the work done and diffuse the knowledge gained.

ARTICLE III.

Members.

Section I. Any person may become a member of this Association, as hereinafter provided.

Sec. 2. Members shall be divided into five classes: Patrons, Life Members, Sustaining Members, Active Members, and Honorary Members.

Sec. 3. Any person contributing at one time the sum of one thousand dollars (\$1,000) to the permanent fund of the Association shall be a Patron. Any person may become a Life Member by the payment of one hundred dollars (\$100) at one time. Patrons and Life Members shall not be liable for annual dues. Sustaining Members shall be those who pay annual dues of twenty-five dollars (\$25). Any forestry association or other organization approved by the Board of Directors may become a Sustaining Member. Active Members are those who pay annual dues of two dollars (\$2). Honorary Members shall be the officers of state, territorial, provincial, or other forestry associations, or the delegates from such associations, or the delegates of any government.

Sec. 4. Applications for membership shall be referred to and voted upon by the Board of Directors at any regular or called meeting therefor.

Sec. 5. All members except Honorary Members shall be members of this corporation and shall be entitled to vote and hold office in said corporation.

ARTICLE IV.

Officers.

Section 1. The officers of this Association shall be a Board of Directors, a President, five Vice-Presidents at large, a Vice-President from each affiliated organization, as hereinafter provided; a Treasurer, a Secretary, and an Assistant Secretary.

Sec. 2. The Board of Directors, President, Vice-Presidents at large, and Treasurer shall be elected by ballot at the annual meeting of this Association, and shall serve one year, or until their successors are elected. The Secretary and Assistant Secretary shall be elected by the Board of Directors at the first meeting following the annual meeting of the Association.

Sec. 3. Any forestry or other organization which may become a Sustaining Member shall be entitled to delegate as advisors of this Association three of its members, one of whom shall be elected by the Board of Directors a Vice-President of the Association. The advisors so elected from the various organizations shall constitute the Advisory Board of this Association.

ARTICLE V.

The Board of Directors.

The Board of Directors shall consist of fifteen (15) members, of whom eight (8) shall constitute a quorum. It shall elect its own Chairman and have the power to fill any vacancy occurring in its own membership or in the officers of its Association, the appointee to serve until the next annual meeting of the Association. The Board of Directors shall have the control and management of the affairs, funds, and property of the Association. It shall take, receive, hold, and convey such real and personal estate as may become the property of the Association for the purposes of the Association set forth in the certificate of incorporation and in Article II above. The Board shall meet one hour before the annual meeting of the Association, and at such other times as it may be called together by its Chairman. The Board of Directors shall designate five (5) of its members to act as an Executive Committee of the Association, to which Committee the Board shall, from time to time, entrust such duties as it may deem best in the interests of the Association.

ARTICLE VI.

The President.

The President shall preside at all meetings of the Association.

ARTICLE VII.

Vice-Presidents.

In the absence of the President, a Vice-President shall preside at the meetings of the Association; and in the

absence of all of them, a President *pro tem*, shall be elected by the meeting.

ARTICLE VIII.

The Secretary.

The Secretary shall keep a record of the proceedings of the Association and of the Board of Directors, shall have the custody of the corporate seal of the Association and of all documents, books, and collections ordered to be preserved; shall conduct the correspondence of the Association, and keep a list of members with their addresses, notify members of the time and place of all meetings, and shall perform such other duties as may be assigned him by the Board of Directors.

ARTICLE IX.

The Treasurer.

The Treasurer shall have the custody of all moneys received. He shall deposit and invest the same in such manner and to such extent as the Board of Directors shall direct, and shall not expend any money except under the direction or approval of the Board of Directors. The financial year of the Association shall close on December 31 of each year.

ARTICLE X.

Meetings.

Section 1. The annual meeting for the election of officers and the transaction of such business as requires to come before the entire Association shall be held on the second Wednesday in January, at such hour and place as the Board of Directors may determine.

Sec. 2. A quorum shall consist of thirty (30) members of the Association (Patrons, Life Members, or Active Members), as specified in Section 5 of Article III.

Sec. 3. Special meetings may be called by the Board of Directors. The Secretary shall give to all members at least seven days' notice of all meetings.

ARTICLE XI.

Dues.

The annual dues for Active Members shall be two dollars (\$2), pay-

able in advance on the first day of January. The Board of Directors shall have the power to remit the annual dues of any member.

ARTICLE XII.

Amendments.

These By-laws may be amended by a three-fourths vote of the members present and entitled to vote at the annual meeting of the Association.

REPORT OF THE COMMITTEE ON RESOLUTIONS.

The following resolutions were then unanimously adopted:

Resolved, That the need of, establishing national forest reserves in the Southern Appalachian and White Mountain regions grows more urgent day by day. We therefore urge the prompt passage through Congress of a bill which shall create these reserves, and thereby not only preserve the natural resources of two exceedingly important regions, but at the same time contribute largely to the stability of the national prosperity.

Resolved, That the American Forestry Association again recommends an increase of opportunities for general forest education in schools and colleges, and for professional training in post-graduate schools; and we earnestly request Congress to take favorable action at its present session upon the bill now pending which appropriates funds for the promotion of forest education and forest experiment work in the agricultural colleges and experiment stations of the United States.

Resolved, That we urge upon Congress the repeal of the timber and stone act, so long a source of fraud and loss to the government; the immediate withdrawal from entry of all public timber land, and the sale of the timber thereon at its market value under proper regulations.

Resolved, That this Association again protests against the attempt to reduce the area of the Minnesota National Forest Reserve, and against any

step that would render more difficult the perpetuation of the forests upon it.

Resolved, That we concur emphatically in President Roosevelt's desire for the preservation of Niagara Falls, and pledge him the support of the Association in his wise effort to that end.

Resolved, That the American Forestry Association believes that the nation should own the Calaveras Grove of Big Trees, and earnestly recommends the prompt enactment of legislation by Congress for the purchase of these trees.

IMPORTANCE OF WATER POWERS.

The *Charlotte Daily Observer*, in its issue of January 14, printed an interesting table of figures, showing the cotton mills in North Carolina, South Carolina, and Georgia which are operated by water power, and therefore directly dependent upon an equable flow of water from streams rising in the Southern Appalachian Mountains. This article was read at the Tuesday afternoon session, and it was voted to make it a part of the records. The following table, being the aggregate figures taken from the large table, shows in a striking manner how closely the protection of the forests in the Piedmont Region, and the consequent conservation of the streams, is related to the industrial welfare of the South and the nation as a whole:

Capital stock.....	\$33,647,500
Number spindles.....	2,077,831
Number looms.....	50,926
Number employees.....	45,685
Number horse power.....	90,495
Number bales per year, counting 11 hours a day..	640,895

The total value of the annual production of the mills enumerated is approximately \$64,060,776.

In presenting the table, which is a most comprehensive and accurate one, the *Charlotte Observer* remarks:

"This table is compiled to show what interests are involved in the maintenance of the regular flow of water in the various streams on which this pow-

er is made. It shows the cotton consumed, the operatives, the number of spindles and the number of looms. The number of operatives should be multiplied by at least three in order to show how many people are dependent upon this resource. It seems that it would be entirely fair to assume that the water power used for all other manufacturing, such as operating saw mills, planing mills, woolen mills, knitting mills, furniture factories, cotton seed oil mills, etc., etc., would make an additional amount equal to that employed in the operation of the cotton mills, and would involve the interest of as many people in respect to employment.

"Therefore it is seen that the preservation of the mountain forests, which is the main influence in regulating the flow of these streams from the mountains, is a matter of the most vital importance. It has been said that when the mountains of Lebanon were covered with cedars and other forest trees, Palestine supported, in affluence, a population of ten million. After and since the denudation of the mountains of Lebanon, Palestine has scarcely supported five hundred thousand people, and these, in the main, in poverty.

"In the table, North and South Carolina and Georgia are considered. Virginia has interests which are not in the enumeration. So also has Tennessee and Kentucky, on the western side of the mountains, which would swell the grand totals given."

The publication of this striking table and the inferences which can be deduced from its figures should stimulate a powerful interest in the South in the Appalachian Forest Reserve. The South has not yet awakened to the magnitude of the menace which affects its industries. Such matter as this is a powerful argument for the reserve, and should have the effect of arousing public sentiment to an immediate appreciation of what the Southern Appalachian Reserve would effect—a safeguard to the treasured industrial activity of the South, and an asset whose value is incalculable.

owned by the state along the Costal Plain was brought to completion.

Up to the close of the past fiscal year, 167 applications were received for advice and assistance in the care of private forest lands, of which 45 were for timber tracts, with a total area of 1,439,763 acres. Working plans were prepared during the same period for eight tracts, with a total area of 1,982,000 acres, in the States of West Virginia, Kentucky, Texas, New Hampshire, Idaho, Washington, and Colorado. The acreage under forest management, in co-operation with private owners, has in this way increased from 500,000 acres, the figure for last year, to 857,995 acres.

A reorganization of the work dealing with forest products has been successfully carried out. The service now conducts several series of laboratory experiments under a trained staff of engineers, including timber tests, the preservative treatment of timbers, and dendro-chemistry. In dendro-chemistry a study was begun to determine the best methods of wood distillation as a means of using waste in logging and at the mill.

The service has taken up the work of gathering for publication full returns showing the annual consumption of forest products. The National Lumber Manufacturers' Association and a number of the associations of producers are co-operating in the work; the trade journals are giving it their support, and there is every prospect that the returns for 1905 will be full and accurate, to the great advantage of all interested in forest products.

A new series of experiments looking to the saving of waste in turpentine made successful progress during the year on the lands of a company which has offered the service unusual facilities near Jacksonville, Fla. It has been tentatively established by these experiments that shorter and shallower "faces" may be chipped without reducing the flow of rosin. This means that the life of the tree may be prolonged and its yield may be largely in-

creased. Another result, which follows from these, is that the investment in turpentine lands becomes a longer-time investment.

The forest exhibit, in conjunction with that of the Reclamation Service, at the Lewis and Clark Centennial Exposition, was the most complete and brilliant forest exhibit ever seen in this country.

State and Local Associations This Association notes with much satisfaction the growth and activity of state and local forest associations. It is only through such organizations that many state and local forest problems may be brought to a prompt and practical solution. A striking example of the value of a state association is furnished by Pennsylvania—certainly the most advanced of our states in forest matters. There the state has excellent forest laws, a very capable state forest organization to administer them, substantial appropriations annually, and an excellent spirit favoring forestry among the citizens generally. This desirable situation is in a great measure due to the splendid efforts of the Pennsylvania Forestry Association, the largest of the state associations. As referred to elsewhere in this report, the American Forestry Association has been co-operating with the Society for the Protection of New Hampshire Forests, and the Massachusetts Forestry Association, especially through FORESTRY AND IRRIGATION, our official organ. These organizations have for some months been sending two thousand copies of FORESTRY AND IRRIGATION to the editors and other influential persons in New England in support of the White Mountain Forest Reserve project. Through the magazine there has also been some co-operative work with the Connecticut Forestry Association, which organization has been growing in numbers and influence. Two new associations were formed during the year, the first being in Ohio. The latest was organized in Michigan, last August, with a substan-

tial membership and with the opportunity to do much effective work.

The Association for the Protection of the Adirondacks, the Vermont Forestry Association, the Minnesota Forestry Association, the Iowa Park and Forestry Association, and the Colorado Forestry Association have all continued their work to advantage, in their particular fields.

As stated before, the American Forestry Association views with satisfaction the work of the state and local forest associations and hopes to see many more formed. While wishing in no way to interfere with their work, this organization stands ready and willing to aid in every way possible those now in existence, and to assist and encourage the formation of others wherever needed.

Eastern Forest Reserves

For several years the American Forestry Association has gone on record as favoring the prompt establishment by Congress of federal forest reserves in the Southern Appalachian region and the White Mountains of New Hampshire. These are among the most important of all the great forest problems that face the country, and the reasons for these reserves are well known to all members of this Association. A special meeting of the Executive Committee of the Board of Directors, early in October, decided unanimously to put the strength and resources of this Association, as far as possible, behind these two projects. Since that time considerable attention has been given to the matter, and it is safe to say that the movement for these reserves is more united than ever before. About 40,000 extra copies of *FORESTRY AND IRRIGATION*, containing authoritative articles regarding the proposed reserves, have been distributed by this association among the editors of the eastern and southern states and to the officers of commercial organizations. In addition, personal work has been carried on, and will continue, in interesting the people of the South through interviews and

meetings. In this connection, it is only fair to say that the southern people have not yet been fully aroused to the vital importance to their leading industries of the creation of a Southern Appalachian forest reserve. But the public men of the South are taking up the problem, and the pointed warning by President Roosevelt in his speech at Raleigh, last October, made a deep impression. It is hopeful that wherever the project is understood it secures solid support. With the South heartily behind the movement for this reserve, it is felt that Congress will act favorably.

In New England, the people are aroused to the importance of preserving the forests of the White Mountain region, through the establishment there of a federal forest reserve. This is due in a large measure to the splendid efforts of the Society for the Protection of New Hampshire Forests, and the Massachusetts Forestry Association, with whom this organization is actively co-operating in this work.

In connection with these eastern forest reserve projects, the American Forestry Association has set itself to probably more important work than any it has yet undertaken; for the proposed Southern Appalachian and White Mountain reserves are a vital necessity to not only their immediate regions but to the country at large.

Canada

A matter of satisfaction and encouragement to this Association is the attitude of the Canadians. They have joined the American Forestry Association in substantial numbers and given it both financial and personal support. A notable delegation from Canada attended the Forest Congress and took a prominent part in its sessions. This interchange of ideas is valuable to both parties, and as the two countries have many forest problems in common, it is fitting that there should be such close and friendly relations.

There is now good reason to expect that the Association work will soon have the large membership, with its

accompanying increase of influence, that the officers have long looked forward to. A well-organized force is at work, including a secretary, an assistant secretary, and four clerks, devoting much of their time to membership work. As a result, there is a steady and substantial increase day by day. In addition to this working force, the members of the Executive Committee

of the Board of Directors are devoting time and energy to the more important matters in which the Association is interested. There is also a growing tendency on the part of our members to lend assistance in the Association work. Once they generally lend a hand, the large membership and greater influence will be assured.

REPORT OF THE TREASURER

For Fiscal Year Ended November 30, 1905.

Otto Luebker, in Account with the American Forestry Association.

Receipts.			Disbursements.		
Balance December 1, 1904.....		\$61 08	FORESTRY AND IRRIGATION		
Interest on bonds.....	\$180 00		PUB. CO.:		
Interest on deposits.....	20 90		3,000 copies per month of		
Life memberships.....	800 00		magazine, Dec. 1904 to		
Dues—Sustaining.....	500 00		Nov. 1905, inclusive, at		
Dues—Annual.....	5,748 33		9 $\frac{1}{4}$ cents.....	\$3,510 00	
Contributions.....	11 00		1,500 additional copies		
Exchange on remittances.....	2 15		of Sept., Oct., and Nov.		
To make good a bad check			issues, at 9 $\frac{1}{4}$ cents.....	146 25	
(See Contra).....	2 00				\$3,656 25
		7,264 38	Postage.....		118 60
			Salary and clerk hire.....		206 00
			Printing and stationery.....		25 15
			Payments on demand loan.....	200 00	
			Interest on same.....	5 08	
					205 08
			Proceedings of American		
			Forest Congress, 1,000		
			copies, at 45 cents.....		450 00
			To make good a bad check		
			(See Contra).....		2 00
			File cabinet.....		23 00
			For Secretary's work.....		1,000 00
			Sundries.....		7 70
					5,693 78
			Balance on hand Dec. 1, 1905:		
			Wash. Loan and Tr. Co.....	1,023 94	
			Union Trust Co.....	607 74	
					1,631 68
		7,325 46			7,325 46

Special Secretary Fund.

DR.		CR.	
Balance on hand Dec. 1, 1904.....	\$1,531 75	Wm. Hall, part expense of Forest Congress	\$164 31
Draft returned by E. A. Bowers.....	500 00	H. M. Suter, for Secretary's expenses.....	1,890 00
Interest on deposits.....	25 83		2,054 31
		Balance Dec. 1, 1905.....	3 27
	2,057 58		2,057 58

Additional Assets.

DR.			Cr.	
Two Chicago and Eastern Illinois 5 per cent bonds (purchase price)	\$2,305 00		Balance, being net additional assets, subject to realization	\$4,677 50
Two Minneapolis & St. Louis R. R. 4 per cent bonds (purchase price)	1,982 50			
Dues outstanding:				
Annual membership	340 00			
Sustaining membership	50 00			
		\$4,677 50		
		4,677 50		4,677 50

By referring to the foregoing Statement of Receipts and Expenditures it will be readily observed that financially the Association is in good health. The remainder of demand loan (\$200.00) was paid off during the year and the bonds of the Association are free now of all incumbrance.

Unpaid dues to the extent of \$390.00 are outstanding. Last year the amount was \$814.00; this shows an improvement.

During the year 136 members were dropped for non-payment of dues, the amount lost being \$666.00.

Respectfully submitted,

OTTO LUEBKERT,
Treasurer.

WASHINGTON, D. C., *December 1, 1905.*

A FOREST RESERVATION POLICY FOR THE EAST*

BY

FRANK WEST ROLLINS

Formerly Governor of New Hampshire; President of the Society for the Protection of New Hampshire Forests.

THERE are now forest reservations in the West amounting to 100,000,000 acres. These lie west of the Mississippi River, and all have been set apart from lands owned by the government, except the Minnesota Reservation, at the headwaters of the Mississippi. This reservation was acquired partly by purchase, and establishes the precedent on the part of the federal government of acquiring forest lands by purchase for reservation purposes.

The proposition is now before Congress to purchase two forest reser-

vations in the East, in the Northern and in the Southern Appalachian Mountains. It is the purpose of this paper to point out some of the reasons for this extension of the forest policy of the government.

The main reasons are, of course, economic. From the days of our great great grandfathers we have neglected systematically one of the nation's staple products—wood—which, next to food and water and fresh air, is essential to our well-being, giving us houses, furniture, tools, fuel, and, more recently, paper. The primeval crop of

*Read at the Annual Meeting of the American Forestry Association, Washington, D. C., January 16 and 17.

timber in the East is gone, save in the less accessible mountain regions, where patches still remain. The new growth is very far from supplying the annual demand upon it, and for the most part is cut off before it is well started, rendering cheap returns instead of profitable returns. Yet there are millions of acres of non-agricultural land in our eastern country, fit only for forest growth, that might yield enormous profits, but do not. They are awaiting an intelligent forest management. Much of our main timber supplies, and all of our best material, is shipped in at great expense from the west. Our wood-manufacturing plants are still found east of the Mississippi River, though they are tending to move to the source of supply. These are axioms to members of this convention; but it is important that the whole people should know them, and that they should be kept closely in mind by members of Congress.

What can be done to remedy the situation? The answer is plain: To give up the time-worn, destructive practices of our ancient ancestors, and replace them by an intelligent forest management. And how can this be attained? The answer is equally definite, though less axiomatic, namely, by government control on non-agricultural land.

The older countries — particularly France, Germany, and Austria—have arrived at this solution, and by such drastic experience, that their laws governing the cutting of timber interfere with the freedom of the individual landholder. Let us be wise enough, if possible, to profit by their experience without undergoing their suffering.

Because of the time element involved in the growth of trees, private ownership of forest lands in all countries, including our own, has proven both wasteful and unproductive. Most of our forests in the eastern portion of the United States are in the hands of private owners; for the most part they are either cut for immediate revenue, without reference to the future, or

else, having been cut, they are neglected entirely. Two splendid exceptions to this statement occur in the state forests of New York and Pennsylvania, New York having purchased more than one million acres in the Adirondack Mountains at the headwaters of the Hudson River, and Pennsylvania nearly a million acres in the watersheds of the Susquehanna and the Delaware. Massachusetts has made small beginnings, and public sentiment is awakening in New Jersey. These are the wealthier states. Some of the less wealthy states may follow, but in less efficient ways and upon diverging lines of policy; but public welfare demands that more prompt and efficient action be taken. The forests of New Hampshire and Vermont, of West Virginia, eastern Tennessee, North and South Carolina, are of inestimable value to the country. It is folly to permit the forest-covered mountains in these states to be denuded, with the irreparable losses by fire and erosion to the soil that always follow irresponsible cutting, making the land in many places barren for all future time. The report of the Forest Service in northern New Hampshire tells us that 84,000 acres in the White Mountain region have been made completely barren in the last fifteen years, and the report for the Southern Appalachian Mountains that probably no region in America is more subject to erosion and flood when the forest cover is removed.

It is not possible that states relatively small in population and in wealth, having no large cities, shall from their scanty means take any well-defined co-operative action. If the facts are once put clearly before the country, the common sense of the people will compel action by Congress.

Few people have stopped to think of the importance of the forest to the forest industries, lumbering and wood-working factories in the eastern states, or of the importance of steady water-flow, both to navigation and to manufacturing along the water courses. The president of the Amoskeag Com-

pany, manufacturing cotton cloth at Manchester, N. H., has said that in 1896 a single flood cost that corporation \$100,000. There are in the eastern mountain region several million people directly dependent upon the steady continuance of the forest supplies. Many lumbering towns and smaller cities have collapsed from the exhaustion of the forest. Even the larger cities, like Buffalo, have suffered when the hardwood market shifted from Buffalo to Memphis. Compare the ephemeral character of our mountain towns with the thrift and contentment of the people in the Black Forest region in Germany, where all sorts of small wares are manufactured with no fear of an exhausted supply. The Black Forest is managed with a view to permanent returns. This steadies the life of the whole people. This principle is equally true in Amer-

ica, though we have given so little attention to it.

It appears that the time for action has arrived for making a beginning. The bills for forest reservations in the White Mountains and the Southern Appalachian Mountains, having been before Congress in previous sessions, have been introduced in the present session. They have met no serious opposition, except that most serious of all opposition—inertia. Let every friend of the forest come to the front at this time. I appeal especially to the friends and farmer sons and daughters of New England who have gone to nearly every western state, and to the many who have visited the White Mountains from all of the states. Each is urged to write at once to his representatives in Congress, both members of the House and of the Senate, asking that these bills may speedily pass.

AN ECONOMIC FACTOR IN FOREST PRESERVATION*

BY

CARYL D. HASKINS

Engineer, General Electric Company.

THERE is no one fundamental of industrial economics more widely recognized than that very simple one relating to the maintenance and extension of foreign trade.

Foreign trade built Carthage, maintained the revenues of Egypt, and gave Greece first place for many centuries among the Mediterranean nations.

None can fail to appreciate the advantages of a creditor nation. So long as a nation can compete successfully in foreign markets, gaining a little from year to year, in relation to other nations, in exports, sending out more

goods to foreign nations than are *brought in* from foreign nations, so long will that nation continue to increase in strength and prosperity in relation to others. All this is obvious. It is less obvious what relation can obtain between the maintenance and increase of foreign trade and the preservation of forest areas. To the average mind, considering the problem in a casual way, there might seem to be but one possible connection between the two matters—the very simple and obvious one that, having once cut away all of our forest tracts, we can no longer be an exporter of lumber.

*Read at Annual Meeting of the American Forestry Association, Washington, D. C., January 16 and 17.

I have no reference, however, to this very small issue. It is quite obvious to those who have studied the question that conservative and judicious lumbering may be carried forward indefinitely without the destruction of any forest areas whatsoever. We need look no further than Germany's well-maintained forestry system for confirmation.

This simple question, however, has no real relation to the subject matter of this paper; it is an issue far less large and important in its bearing upon the whole problem than that which has prompted this paper.

In pointing a conclusion, it is perhaps preferable to localize the discussion to some relatively restricted area, and the region chosen for the present argument is the Southern Appalachian chain (with the Smoky Mountains the central group) extending through the Carolinas and into Tennessee and Georgia. Certain sections of this area have been, and I understand others are still being, ruthlessly stripped of its timber. Over the lower country, sloping downward to the Atlantic, are scattered numerous textile mills, which constitute one of the chief elements—perhaps the greatest single element—making for the increased prosperity of the South.

From these great weaving and spinning establishments the South sends out annually an already vast and rapidly increasing volume of export cotton goods. The South is, in short, struggling for, and has perhaps already in a large measure achieved, supremacy in the cotton goods trade of the Orient. The balance of foreign trade is, in short, in favor of the South, and this balance is growing daily with the growth of the industry.

To maintain or increase its position in the cotton industry, it is essential that the South should produce its export cotton goods at low initial cost. Only by the introduction and constant betterment of machinery and modern methods can we hope to compete with

the cheap labor and physical propinquity of Japan and other industrial nations in the great eastern market. One of the large factors in the cost of production of textiles is *power*. The maintenance or loss of foreign trade may very well rest in the cost of power.

Over 50,000 horse power of electrical energy is already in actual use today in southern textile mills for driving weaving and spinning machinery and for kindred purposes, directly contributing to the low cost in the manufacture of cotton goods. The application of the so-called "electric drive" on an extensive scale is relatively new, and has had a most pronounced effect upon the first cost of the product; in fact, one may venture to say that it has been a very large factor in the increasing credit balance of the South in connection with foreign trade.

There can be no doubt that the extension of this economic step will be rapid, and if the obvious precautions which are pointed out in the latter portion of this paper are promptly and effectively taken, the rapid increase in our percentage of the total cotton trade of the Orient should apparently be secure. Of the 50,000 horse power of electrical energy utilized in driving textile machinery, a very large proportion is derived initially from water power.

Like most countries underlying an extensive mountain system, the South is rich in water powers, many of them of great volume. A relatively very small number of these have as yet been fully developed. The character of the Southern Appalachians is such that, in their natural condition, with their relatively dense forest areas, their thick tangles of laurel, and their deep bed of moss, loose decomposed rock, vegetable mould, and other absorbent material—all technically known in forestry, I believe, as the "sponge"—these mountains are almost ideal in their ability to store up the rainfall and deliver it over slowly and at an equal rate to the headwaters of the rivers which flow into the Atlantic.

The stripping off of the forest, giving the rain full immediate access to the "sponge," rapidly washes away all of the loose and absorbent material, and the result is quite obvious: Nature's storage system is destroyed, the water is no longer conserved and fed down to the streams at an uniform rate, but rushes immediately into the stream heads and thence into the sea in flood. A short period now suffices to carry off the rainfall, and in a brief time (and especially during periods of drought) the streams are without feeders and the water powers without water.

Such mountain sides, stripped of their soil, can no longer produce the vegetation essential to the building up of a new "sponge," and the result is obvious.

An endeavor has here been made to draw a picture of what may very well result from a general condition such as that which now unfortunately prevails in more than one comparatively extensive area in the Appalachians. There are already a few points where the effect is felt and appreciated industrially. Doubtless there are many more where it is felt without any real appreciation of the cause. The necessity for checking this danger is too obvious to require enlargement. There are other issues involved, which are immediately associated with that which has been pointed out. One may, for example, point to the washing down of the soil from the mountain sides as having a second disastrous and permanent effect upon export trade.

This "sponge," washed down from the naked mountains, becomes mud

and silt in the stream bottoms. Carried down yet further, it deposits in the lower reaches of the streams, filling channels and obstructing deep waterways, and finally, by rendering the harbors unsuited for deep-water vessels, has a direct and serious effect upon the shipping industry. More than one harbor which fifty years ago gave anchorage and wharfage to deep-water craft, is today practically ruined for foreign trade purposes; and the constantly increasing activity in harbor improvement, dredging and maintenance, which is so conspicuous a feature of our national statistics, is, in a large measure, a result of the bringing down of mountain "sponge" to places where it is not wanted.

The general sweeping away of the forest areas of the Southern Appalachians would menace and in a large measure destroy the water powers of the South. The destruction of the water powers of the South would seriously increase the gross average cost of cotton fabrics, and an increase in the gross cost of cotton fabrics directly menaces the maintenance and growth of foreign trade in these commodities. The loss of foreign trade in cotton fabrics directly menaces the prosperity of the South.

The South must save its forest areas. It is obvious that the same conditions which have been pointed out in this paper in relation to a single industry obtain directly and with the same arguments and force to most other manufacturing industries; and to agriculture also, for, with alternate drought and flood, agriculture cannot prosper.



FORESTRY EDUCATION AND EXPERIMENTATION IN THE AGRICULTURAL COLLEGES AND EXPERIMENT STATIONS*

BY

SAMUEL B. GREEN

Professor of Horticulture and Forestry, University of Minnesota.

AS I see the forestry situation in this country today, it is about as follows: Our more progressive and thinking people are deeply interested in the subject of forestry, and eagerly grasp any good matter that may come into their hands that bears on this subject, and the owners of forest land want to treat their holdings more rationally, but as a whole they know little of what practical forestry means. The present situation has been largely made through the efforts of the national Forest Service, and it is a very hopeful condition. This grand service is in close touch with the forest interests of the country, and is doing much to stimulate thought along these lines; but of necessity its work is largely concerned with the administration of the national forest reserves, which it is fast putting on a sensible basis. I think what the situation especially needs at present is the development of more detailed ideals of forestry more generally among our people. The chief of the Forest Service is well aware of this fact, and for some time has been trying to get some forest studies introduced in the schools. In connection with this thought I would like to call attention to the history of agricultural education in this country.

In 1862 Congress passed what has become known as the first Morrill bill, which gave to each state and territory the proceeds from the sale of a large amount of public land, and 30,000 acres for each representative and sen-

ator in Congress, for the purpose of establishing agricultural colleges. Later, in 1887, an annual appropriation was made, which now amounts to \$15,000 a year for each state and territory, for experiments in agriculture. In the following year what finally became an annual appropriation of \$25,000 was made for the purpose of teaching agriculture in the agricultural colleges. The result of these appropriations for education and experimentation in agriculture has been to put agriculture upon a very different basis from what it was previously. Instead of an empirical practice, it has largely become a profession, and not only has it developed as a science, but as a result of the teaching given in the colleges and the results of experiments undertaken in the experiment stations, the wealth of the nation has been greatly increased. Some of the brightest statesmen in this country believe that the increase in the value of agricultural lands, which has been so rapid in the last ten years in the western states, has come largely from the spread of correct agricultural knowledge, largely as the result of this national movement.

If any one will examine the agricultural literature that was read by our people previous to 1890, and compare it with what we have today, a great difference will be noted, and the empirical statements of even twenty years ago would scarcely interest the best farmers of today. Not only is this true, but while formerly our farming

*Read at Annual Meeting of the American Forestry Association, Washington, D. C., January 16 and 17.

population paid very little attention to agricultural literature, they now seek for it and our best farmers are closely in touch with agricultural science.

The time from 1890 to 1900, when the great force of agricultural teaching was most effective, might be aptly termed "The awakening of American agriculture." As yet the agricultural colleges have done very little in the way of teaching forestry, which is a form of agriculture that they are well equipped to teach. The collateral forestry subjects relating thereto, such as botany, soil physics, surveying, entomology, and economics, in which the forester should have some training, they are well equipped to give. They also give courses in a large number of subjects that help to excite interest in country life and which the forester would find helpful and should understand. The one thing that they lack to fit them for giving good forestry courses is that which relates to the cultivation and growing of trees and general forest management. This could be easily supplied by a professorship in forestry in each state. It seems to me, therefore, that these institutions, which are in a measure national educational institutions, having been founded by the national government, should be provided with the means and required to teach this subject, the proper practice of which will have such a wonderful effect upon the national welfare. Then, too, the agricultural experiment stations are well equipped for experiments and demonstrations in forestry, and are naturally looked to for counsel in rural matters.

I believe that Congress will respond to an application for funds for this purpose, provided that what is here stated can be clearly shown. To have attempted to carry out this idea twenty years ago, at the time when the agricultural colleges received their appropriation from the second Morrill bill, would have been difficult of fulfillment, for it would have been almost impossible to have found men with suitable training to teach these sub-

jects. The situation today is very different. With the example set by the Forest Service in the matter of correct forestry ideals, and with the encouragement which it has held out to induce young men to take hold of this subject, we now have a large number of young men who are well trained to teach these subjects, and I feel that the present Congress ought to be asked to take hold of this matter and make appropriations exclusively for teaching and experimenting in forestry. If national funds are appropriated for this purpose they should be spent under suitable supervision, for otherwise there is such a great ignorance in regard to the subject in a few states that I fear the funds would be frittered away or be spent foolishly.

At the instance of the chief of the United States Forest Service, I have prepared a bill asking Congress to appropriate \$1,500 for each agricultural college for teaching forestry, and \$2,000 a year for each experiment station for experiments in forestry. The supervision of the spending of this fund is put in the hands of the Secretary of Agriculture, who has the power, under this bill, to withhold appropriations from any state if he thinks the funds are being misused. As I drew the bill it provided that the fund should come from the sale of public lands; but Hon. C. R. Davis, who has introduced and has charge of the bill, thinks it would be best to have it come out of the general treasury fund. It will require about \$150,000 a year to carry this into effect.

As to just what the agricultural colleges should teach in the way of forestry, I do not wish to discuss at great length here; but would say that their efforts should, in my opinion, be largely confined to the teaching of what might be called farm forestry; and they should in but few cases attempt anything in the way of turning out professional foresters, although in the very nature of the case many of the young men trained in the forestry

course in these colleges will become professional foresters through later training. I believe that the possibilities for good work in popularizing forestry in this country, through the in-

strumentality of the agricultural colleges, in some such way as has been outlined, is not generally realized, and I think that this idea should be adopted as a part of the national forest policy.

WATER POWERS OF THE SOUTHERN STATES*

A Discussion of Their Relation to the
Southern Appalachian Forest Reserve.

BY

HENRY A. PRESSEY

Hydrographer, U. S. Geological Survey.

THE water powers of the southern states have for many years remained undeveloped and this great source of power has been allowed to run to waste.

The reason for this is, perhaps, four-fold: First, the southern people had become interested in the production of raw cotton rather than in its manufacture. Second, during the last fifty years there has been insufficient capital for the development locally of water powers and the construction of manufacturing plants. Third, the necessity of placing the factory at the site of the power, now overcome by long-distance transmission of electric power. Fourth, northern capital has been under the impression that the southern rivers were practically dry in the summer season.

The first reports written concerning the rivers of the southern states were made by northern engineers, who were accustomed to the large lakes and marshes of the northern states, and who thought that rivers not having these equalizers of flow were sure to have exceedingly small discharges during the dry season.

Fortunately, the United States Geological Survey in 1895 began a sys-

tematic study of the discharge of the south Atlantic and gulf states, and has since that time maintained gaging stations on nearly all of the important southern rivers. From the data obtained very satisfactory estimates of the daily flow have been made which are, without question, far more valuable in determining the low water discharge during the last ten years than any possible estimates that could have been made from rainfall data, or by comparison with northern watersheds.

From these records a comparative list has been prepared showing that the minimum flow of rivers throughout the Carolinas and Georgia are larger per square mile of drainage basin than on the rivers of New England or the middle states.

The lowest flow ever recorded on the Yadkin, Catawba, Broad of South Carolina, Broad of Georgia, Savannah or Coosawatee, is over .2 of a cubic foot per second per square mile; while records are available on the Potomac and Susquehanna showing less than one-half this amount per square mile of drainage basin.

The reason for this is not difficult to determine. The very high rainfall and remarkably even distribution of

*Read at Annual Meeting of the American Forestry Association, Washington, D. C., January 16 and 17.

this rainfall throughout the year has an important effect, and while the southern rivers lack lakes and marshes, the soil is deep and porous and re-

tain slopes, upon which the rivers rise, are in general forest-covered.

Great interest is now being taken in the development of southern water



Toccoa Falls, Habersham County, Georgia.

tains the water, allowing it to gradually reach the stream, equalizing the flow throughout the year; while the moun-

tain slopes, upon which the rivers rise, are in general forest-covered. Great interest is now being taken in the development of southern water powers. There are eight or ten powers now being developed, or which are soon to be developed, each of these

powers aggregating 10,000 horse power or more. There is no natural resource of the southern states that needs more careful fostering and attention than water powers.

The region proposed to be set aside as the Southern Appalachian Forest Reserve is well watered, and from it several of the largest rivers of the country receive their supply. The chief rivers in the states of Virginia, North Carolina, South Carolina, Georgia, Alabama, Tennessee, and West Virginia rise in these mountains. One of the principal tributaries of the Ohio and one of the largest feeders of the Mississippi head here also. So that this region may justly be considered one of the important watersheds of the United States. The Yadkin, Catawba, Broad, Saluda, and Chatooga flow into the Atlantic; the Chattahoochee and the Coosa flow into the gulf. New River flows to the north and enters the Kanawha, whose waters finally reach the Mississippi through the Ohio; while the Tennessee with its large tributaries, the Holston, the Nolichucky, and the French Broad, flow to the west through the state of Tennessee, finally entering the Mississippi. The Cheoah, the Nantahala, the Oconalufy, and the Tuckasegee, all large streams, join their waters to the Tennessee and flow in a narrow and rocky gorge through the Great Smoky Mountains, while the Hiwassee unites with that river in the state of Tennessee beyond the mountains.

At various points along their courses all of the streams possess magnificent water powers which present conditions favorable to development, and which at some future time will be made to supply the varied and growing industries of the nearby region with the power necessary for their continuance and growth.

The value of these water powers is limited by their low water flow. Deforestation means the destruction of the only source of natural storage in the region, and that the rainfall will reach the stream almost as soon as it

falls, so that in the dry season there will be no reserve supply to augment the low-water flow, which is drawn principally from the sub-surface sources.

The area embraced in the proposed Southern Appalachian reserve belongs to that portion of the eastern United States characterized by the greatest annual rainfall, there being places along the southeastern slopes of the Blue Ridge which receive an annual precipitation not exceeded elsewhere in the United States, except along the northwest Pacific coast. The average rainfall for a period of more than ten years at various places in the Southern Appalachian Mountains, in northern Georgia and western North Carolina and South Carolina has been nearly 73 inches, while at times the precipitation for a single month has been between 20 and 30 inches, the greatest amount falling in the three summer months and the least in autumn, the amounts in winter and spring being about the same.

This is pre-eminently a region of mountains. The slopes are mostly covered with deep soil, which is kept in an open, porous condition by the humus that enters into its composition and is spread over the surface, and which is held in place by the myriads of roots of trees and shrubs and grasses growing upon it. In this region the raindrops are battered to pieces by the twigs and leaves and the water is caught by the grasses, shrubs, and ferns below and soaks through the covering humus into the soil and rock fissures underneath.

The portion that is neither used by the vegetation nor evaporated from the surface emerges about the mountain slopes weeks or months after its fall in countless springs, that feed with striking regularity the many brooks, creeks, and rivers which thus have their sources here. These conditions combine to make this one of the best watered regions on the continent.

After a storm, the streams rising in the deforested areas are extremely tur-

bid with mud from the mountain sides, while those from the forest areas are comparatively clear. This erosion can be noted by the most casual observer, and it forms one of the greatest menaces to the region. The soil is fertile and deep, as is shown by the splendid growth of forest trees and by its yield under the first cultivation; but it is only a question of time, if the forests are wantonly cut, when all of the soil

stream—is liable to be swept away by its rapidly increasing force.

During the spring of 1901 this region was visited by the most severe rainstorm of its recent history. Many of the streams rose to unprecedented heights, and the flood damages to the farms, bridges, and dwellings on or near practically all of the streams flowing from these Southern Appalachian Mountains were enormous. Dur-



Soil Removed and White Sand Spread Over the Surface of the Catawba River Lowlands.
The damages along this river from the floods of May and August, 1901,
aggregated about \$1,500,000.

and vegetation will be washed from the mountain sides and nothing will remain but the bare rock.

The floods, due to protracted rains, are also destructive in strips of valley lands bordering the streams in the mountain region and in the wider valleys along their courses across the lowlands beyond. Bridges, mills, settlements, public roads, dams for developing water power—indeed, everything in the course of such a mountain

ing the summer season, later floods added largely to this destruction.

Along the valley of the Catawba River, in its course across the two Carolinas, these flood damages to farms, bridges, highways, buildings, etc., during the high-water season of 1901, aggregated nearly two million dollars. The storm damages during the same season along the tributaries of the James, the Roanoke, the Yadkin, and the Broad, in Virginia and

North Carolina, added a million dollars; and those on the tributaries of other streams rising about the Blue Ridge in South Carolina and Georgia add still another million, making four million in all for the streams flowing from the Blue Ridge across the Piedmont plateau. Add to this the damages along the streams flowing out of the Southern Appalachian Mountains to the north, west, and southwest, and

On the Tuckasegee, Little Tennessee, and Hiwassee, in North Carolina and Tennessee, \$500,000.

On the tributaries of western Georgia and Alabama streams rising in this region, \$500,000.

This aggregate of \$10,000,000 tells a story of destruction never before equaled in this region. Bridges were swept away by the score, houses by the hundred; thousands of miles of pub-



Layer of Sand spread over the lowlands bordering the Catawba River by a flood in May, 1901.

we have another and a larger story of destruction:

On the New (Kanawha) and other smaller adjacent streams in Virginia and West Virginia, \$1,000,000.

On the Watauga, in North Carolina and Tennessee, \$2,000,000.

On the Nolichucky, in North Carolina and Tennessee, \$1,500,000.

On the French Broad and Pigeon, in North Carolina and Tennessee, \$500,000.

lic roads were washed away almost beyond the possibility of repair.

The soil in the narrow, irregular, fringing valley lands in the mountain region was in many cases partially and in other cases completely washed away. In the lowlands beyond, the broader bordering valleys were denuded beyond recuperation. Some areas were denuded of soil, while others were covered with desert-like.

almost barren, white sand, extending for miles along the course of a stream.

Since the value of a water power depends entirely upon the water available, anything tending to reduce its amount or to change its distribution by increasing the violence of the floods and at the same time diminishing the low-water flow, will work injury in precise proportion to the change produced. This result is inevitable upon the deforestation of the drainage basin and on many of the streams has already become evident.

More than 24 per cent of the total area of this region has been cleared of its forests.

The states through which flow the streams rising in the region of the proposed Appalachian forest reserve have for many years past been devoted mainly to agricultural pursuits; but within recent years a great awakening has come, and a tendency to manufacture the raw material at home has become manifest. Already the results are to be seen in the increased prosperity of the region, resulting from the development of diversified industries.

There has been wonderful progress in cotton manufacturing during the last ten or fifteen years.

North Carolina, which had in 1887 200,000 spindles, in 1904 had 2,000,000; and South Carolina, with 230,000 spindles in 1887, had in 1904 nearly 3,000,000.

North Carolina has today as many cotton mills as Massachusetts, though they are not as large.

The five first states in the Union in cotton manufacturing, arranged according to number of spindles, are Massachusetts, South Carolina, Rhode Island, North Carolina, and Georgia. These facts are stated to show the immense progress that has been made in manufacturing in the South during the last few years and illustrate the importance of power in these states. Many new mills are run by water power, and from the present outlook the day is not far distant when the great majority of

southern mills will be operated by the power delivered to them electrically.

Water power is universally recognized as the cheapest power to be secured for any kind of manufacture; for when once the constructional development is at an end the attendant expenses become very small, since, through the operation of the laws of nature, the water flows without cost day and night, while every ton of coal that passes in at the furnace door represents a certain expenditure, and in plants requiring great power this fuel cost may come to represent a large proportion of the cost of manufacture.

In the past the chief advantage of steam power over water power was the mobility of the former, for steam could be generated wherever fuel could be obtained and mills could be built where the transportation facilities were such as to insure the quick disposal of the finished product. By reason of the great improvements in electrical transmission of power, steam has lost its advantages, for water power can now be brought to a mill for distances of many miles more cheaply than power can be obtained from coal at most points. The water powers, therefore, in the not far-distant future may become as valuable as coal mines, and as the local coal supply becomes more costly by reason of deeper mining the water powers will increase in value.

This wealth should not be wantonly wasted. Its present value can be conserved and its future value increased by the preservation of the forests about the headwaters of the streams; and this preservation would seem desirable therefore, if for no other reason than this, entirely apart from the wealth-producing capabilities of the forests themselves.

It is impossible at this time to give an accurate statement of the total power available on all the streams rising in and flowing from this area. Any discussion of this, based on the total fall from source to mouth and the average quantity of water carried by the stream, would be worse than mislead-

ing. The fact that there is on any stream a certain fall within a certain distance, over which flows a certain amount of water, does not mean that this locality constitutes an available water power. Theoretically the power is there, but practically it is non-existent unless it can be developed and brought to use for a sum which is not prohibitive. In other words, the availability of a water power depends entirely on the economic situation at the point considered, and every location must be viewed by itself in such determination.

It is, however, certain that on all of these streams large amounts of power can be easily and cheaply developed when the demand for it is sufficient, for the average fall in the streams is

great, and is noticeably high at great numbers of points, while the low-water flow is fairly large on account of the large annual rainfall and the storage effect of the great forests. Furthermore, at many points the conditions favorable for easy and cheap development are present, and on some of the streams surveys have been made which render approximate estimates easy.

It is safe to estimate the available but undeveloped water power on the streams rising among the Southern Appalachian Mountains as equivalent to not less than 1,000,000 horse power, and the developed power is 120,000. The future value of these water powers, as, indeed, the future value of almost anything of value about these mountains, depends largely upon preservation of the forests.

SUGGESTIONS FOR FOREST POLICY*

BY

ARTHUR P. DAVIS

Assistant Chief Engineer, U. S. Reclamation Service.

IT IS gratifying to note that the American public is now thoroughly alive to the necessity of preserving and fostering its forest resources. This valuable public sentiment should be utilized to the utmost by the leaders of the movement to secure needed legislation to stop the devastation of our forests and secure the renewal of those already destroyed.

To this end the first and most imperative step is to stop, at once and forever, the alienation of the public forest lands. Every acre of forest land in public ownership should be included in a forest reserve and a scientific control exercised over the grazing and cutting thereon. This policy should have been adopted forty years ago. There is no excuse for further delay. Private lands bearing forests should

be added to these reserves as fast as practicable and they should be made nuclei for forest extension by planting and cultivation.

Much has been truly said in condemnation of the fraudulent entries of valuable timberland under the Timber and Stone Act. Without excusing the frauds, it must be admitted that the primary blame rests with the law. Under present law there is no way to obtain leave to cut timber except by acquiring title to the land. No one can file on more than 160 acres, and this area is entirely too small to furnish a timber supply to a modern sawmill. To secure such a supply of timber as will justify the establishment of such a mill as can be profitably operated, it is necessary to obtain control of thousands of acres of timber, and under

*Read at Annual Meeting of the American Forestry Association, Washington, D. C., January 16 and 17.

present laws it is almost impossible to do this without fraud, or at least evasion of the law. The only remedy is such change in the law as will permit the sale of mature timber on public land, while the preservation of the growing crop remains in scientific hands. It is peculiarly fortunate that the forest reserves are under a supervision that inspires universal confidence.

In the absence of public control of the timber that has now passed into private hands, it becomes important that every device be employed to check the destruction that cannot be directly prevented. The moral force of this Association in this direction can hardly be overestimated, and we should be faithful and vigilant in exerting that force at all points.

In view of the present tendency to revise fiscal laws, the friends of the forest should not forget that we are at present virtually offering a pecuniary bounty on the destruction of our forests by levying a tariff on lumber, woodpulp, and other forest products. Far more efficient than steel, cement, glass, paper, or any other possible substitute for our native woods are the forests of Canada and tropical America, which, if permitted, would be largely used in this country, and would tend to check the destruction of our native forests. Incidentally, it would ameliorate the lot of the settler on the plains and every one who employs this prime necessity of civilization. If it were possible to import iron and steel, it would stimulate the use of these more permanent and less inflammable substitutes for wood, and in a measure accomplish by a short cut what we are trying to promote by laborious and expensive measures of preservation and reforestation.

The devastation of forest fires can be, and should be, stopped. An efficient patrol can largely prevent fires, and they can be held in check by an intelligent system of fire guards. Many fires are caused by railway locomotives, and these should be prevented by

clearing the ground of combustible material for a considerable distance on each side of every railway track through forests. These would thus become fire guards to stop the progress of any fire started from any cause. Every wide river is a natural fire guard; smaller streams may become fire guards by clearing their banks for a distance on each side. By clearing occasional short strips in suitable places the guards formed along railways and rivers may be so connected that the whole forest region would be divided into blocks of moderate area, to one of which any fire would be confined.

During the past fifteen years the production of Portland cement in the United States has increased about ninety-fold; it has nearly quadrupled in the past five years. In 1890 nine-tenths of the Portland cement used in this country was imported; now less than one-fortieth is imported, and the imports are still large. To a great extent this has been used in the erection of concrete structures which would otherwise have been built of wood. The use of steel, glass, and other materials as substitutes for wood has greatly increased in the same time, and yet the consumption of wood in this country is constantly increasing, in spite of the steadily increasing price of lumber. This means that the actual demand for wood has greatly increased and is constantly growing.

There is no doubt that wood is now used for many purposes for which its use should be discouraged or prohibited, on account of its inflammable nature. The construction of wooden buildings and the finishing in wood of stone, brick, and steel structures is far more common than it should be, and is a menace to both life and property. The remedy lies in more education along the lines of true economy and greater stringency of fire laws.

Scientific forestry does not mean the continued preservation of individual trees, but merely their preservation until ready for harvest and the preven-

tion of wanton waste. The present system of waste and destruction is similar to the practice that was followed regarding the American buffalo, which led to quick extermination. Scientific forestry, on the other hand, means the handling of our forests as the farmer handles his herd of cattle. The young are cared for to maturity, and the

slaughter is carried on in such a way as to preserve and increase the race, while securing the maximum results in the shape of matured product. The proper policy will not materially decrease the present output of forest products, and will ultimately greatly increase it, if we are consistent in applying rational methods all round.

EDUCATION IN FORESTRY IN THE PUBLIC SCHOOLS AND COLLEGES*

BY

DR. GEORGE T. WINSTON

President, North Carolina College of Agriculture and Mechanic Arts.

ONE of the greatest problems before the American people is the building up of rural life. This problem resolves itself into three great factors, to wit: Agricultural education, road building, and forest conservation. The national government, recognizing the supreme necessity of agricultural education, has provided liberally therefor through the "Morrill Bill," establishing agricultural colleges in each state and territory; the "Supplemental Morrill Bill," increasing the appropriation for the colleges, and the "Hatch Act," establishing agricultural experiment stations in connection with the agricultural colleges. Various states have supplemented the work of the national government in the direction of agricultural education by additional appropriations to the agricultural colleges, and by state agricultural departments, whose work supplements that of the colleges. This system of agricultural education will not be complete until it includes a series of agricultural normal schools for the training of rural teachers in all subjects relating to rural life.

Of equal importance with agricultural education as factors in the upbuild-

ing of rural life are road building and forest conservation. Indeed, they are essential parts of agricultural education, and they should be included in any complete scheme of agricultural instruction. The national government should add to the agricultural colleges departments of road building and forestry, with adequate appropriations for their support, and the state governments should join in supporting and developing them. The problem is too great and the task too big to be undertaken exclusively by the states.

The conservation of our forests is not a local matter, but a supreme national necessity. Every use to which wood is now applied, every influence exerted by forests upon water supply and water-flow, every reason that makes forests valuable today for health, for pleasure, for sport, for scenery, for timber, for manufactures, for grazing, for soil preservation, for flood prevention, is an unanswerable argument for forest conservation.

Forest conservation means the preservation of mountain soil from denudation and of Piedmont soil from flood and destruction. Over 200 square miles of soil is annually washed into

*Read at Annual Meeting of the American Forestry Association, Washington, D. C., January 16 and 17.

rivers and carried to the sea by devastating floods, not to consider the destruction of crops, houses, and animals. Forest conservation will prevent increase of, and wise reforestation will diminish, this tremendous loss.

Forest conservation means a perpetual supply of wood for manufactures. Furniture factories, box factories, barrel and tub factories, woodpulp and paper mills will need timber hereafter as well as now, which can be supplied only by a wise system of forest conservation.

It means a perpetual lumber supply for building purposes. Houses, ships, cars, bridges, mines, and other structures will always need wood. The railroads alone are consuming annually over one million acres of forests. Without forest conservation the supply will soon be exhausted.

Forest conservation means a maximum of forest yield, a maximum of lumber, of water, of agriculture. Deforestation means destruction of lumber, of water, and of agriculture.

In the language of President Roosevelt, "Use the forests for grazing, for farming, for lumber, for whatever they are best adapted; but so use them that you will not destroy their usefulness for future generations."

Forest conservation, by keeping the forests and using them too, will be an unanswerable demonstration that a wise people may "*eat their cake and keep it too.*"

Forest conservation should be taught in every school and college. The national government should give a great lesson in forest conservation to sixty million people by establishing the Appalachian Forest Reserve. The United States owns sixty forest reserves, of

about 100,000,000 acres, worth \$250,000,000. Not one is east of the Mississippi River. The proposed Appalachian Reserve will contain four million acres and cost ten million dollars.

Every mountain system west of the Mississippi River contains a forest reserve. The Appalachian Mountains, extending from Pennsylvania to Alabama, are, from every point of view, the most important system on the continent. To crown their summits with a national forest reserve—the largest, the grandest, the most useful on the continent—would complete the system of national forest reserves.

The Appalachian Forest Reserve is located in seven states with 13,000,000 inhabitants and is within twenty-four hours of 60,000,000 people. It is, *par excellence*, the health and pleasure region for all the states east of the Mississippi River.

Over one million horse power yet remains to be developed in this region, provided a steady stream-flow can be maintained. To do this, the forests must be preserved. Continued deforesting will destroy much water power that is already developed.

In the Appalachian Mountains rise many great rivers, flowing through many great states, whose waters, for power, for commerce, for health, for water supply to cities, and food fishes should be guarded with the utmost care from contamination and diminution.

The matchless flora and fauna and natural scenery of the Appalachian Forest Reserve would be a sufficient reason for their preservation, forming in the heart of the East Mississippi country a perpetual paradise of health and pleasure, where weary mortals may go for all ages and become strong again on the bosom of Mother Earth.



MUTUAL RELATIONS OF THE FOREST SERVICE AND THE RECLAMATION SERVICE

BY

C. J. BLANCHARD

Statistician, U. S. Reclamation Service.

THE Forest Service and the Reclamation Service are the infant prodigies of the Department of Agriculture and of the Interior. Neither has emerged from its swaddling clothes, but both are mighty healthy infants and are attracting a good deal of public attention. Since they became big enough to sit up and take notice they have been occupying places at a table upon which the principal dish was a large piece of the public domain. Like Jack Sprat and his wife, they have proceeded to lick the platter clean; but they have been well-behaved children and have not quarrelled over their portions.

The forestry infant has shown an exceeding fondness for mountain tops, steep-sided hills, old pine barrens, and high altitudes generally, while the Reclamation Service has selected the valleys and mesas.

Great national movements are not developed suddenly. The movement for a common-sense national forestry policy, like the movement for national reclamation of arid lands, has been gathering lungs and body for many years. The promoters of both experienced many grievous disappointments, and more than once all but gave up the fight. For more than a quarter of a century the best minds in the West, in season and out, urged the wisdom of the nation engaging upon the work of making its richest lands habitable, but prejudice due to lack of knowledge of the West's resources blocked every move for national irrigation.

The forestry movement travelled over the same stony thoroughfare. From first being declared chimerical to later being denounced as paternal and sectional legislation, both movements drilled their way through the opposition and won national standing.

Neither, however, would yet have achieved congressional endorsement and have become crystallized into law had it not been for the forceful, tactful, and persistent efforts of our Chief Executive, the first occupant of the White House whose knowledge of the West was not gained solely from books. For him the desert held no secrets, and in the forest he was at home. With his strong and virile personality behind both movements the prejudices against these measures gave way. The clogged and cumbersome wheels of legislative machinery were set in motion, and in the brief time of one administration, fruition long withheld, came to the hopes of the advocates of national forestry and irrigation.

Three years of field work by the Reclamation Service—years full of things accomplished, great engineering works begun, and the real battle with the desert well under way—have served to emphasize the wisdom of the forestry law. The investigations of the reclamation engineers and hydrographers have carried them over many thousands of miles of valley and plain and to the distant headwaters of the streams. It has been forcibly impressed upon them that the greatest present need in many sections is forest

*Read at Annual Meeting of the American Forestry Association, Washington, D. C., January 16 and 17.

preservation and restoration. With the tremendous development which has been taking place in the great American desert, and which is yet going on, the question of preserving the forests to conserve and regulate the flow of streams becomes greater every year. Without the protection of the forests, and under the old policy of permitting the public timber to pass unrestricted into the hands of private owners, the limit of agricultural development in many western states had practically been reached; in fact, the denudation of the forest cover in several sections had been so complete that agriculture in the valleys below became a failure and wide areas returned to the desert.

The greatest asset of three-fifths of the United States is the water in the streams and underground. Upon the proper diversion and scientific utilization and application of this water depends the future of a region of immeasurable resources and productivity.

Private capital has wrested ten million acres (or another state of Massachusetts) from what was once worthless desert. Two million people now dwell in prosperity and content in a region only a short time ago the most forbidding and desolate on our continent. Cities populous and prosperous have risen in the desert and have attained commercial and mercantile greatness. Every available stream is now a potent factor for good. Modern methods and machinery have transformed the broad prairies of Louisiana and southeast Texas into productive rice fields, and irrigation in a few years has already fulfilled Secretary Wilson's prediction that from an importer this country would become an exporter of this important cereal.

Neither forestry nor irrigation are local questions. Their application is by no means confined to the arid regions. The denudation of forest cover in the South Atlantic states has already been followed with dire consequences to the irrigated rice plantations. The

character of numerous tidal streams has been radically changed, and thousands of acres in rice plantations have been ruined. With the mountains covered with dense forests, these streams were not subject to sudden and dangerous floods, and the regular rise of the tides was utilized in irrigating the cultivated areas. Today many of these streams rise twenty feet in a night and, coming down with tremendous force from the deforested slopes, are no longer restrained by the dikes, but sweep over the fields and destroy them.

The dream of the future to make a populous empire out of the great American desert could never become a reality without the enactment of national forestry and national irrigation laws. Under the policy of our energetic young Forester, Mr. Pinchot, we are going to cut our forests and still have them. There is to be no more of this ruthless and wanton wasting of the timber resources and the attending decrease of the precious water supply.

It is not strange, therefore, that we of the Reclamation Service feel a deep and kindly interest in the growth of the Forest Service. In the extension or activity of that service in the West will come an enlargement of the work of national irrigation.

We have all been very much impressed with the personnel of the Forest Service. It has been my pleasure in travelling over the West, and while in Washington, to meet a great many members of the service, and I confess to a feeling of surprise that Mr. Pinchot has been able, in so short a time, to collect about him such a corps of clean, vigorous, intelligent, and ambitious young men. As in the Reclamation Service, the *esprit de corps* is exceptional. There is a loyalty and devotion to chief, and love of the work, which is remarked on every hand by other government employees. Such sentiments predicate future success, and at the same time are subtle compliments to the men who are responsible for the two organizations.

ALABAMA'S INTEREST IN FORESTRY*

BY

LESLIE L. GILBERT

Secretary, Alabama Commercial and Industrial Association.

AN INTEREST in forest preservation is slowly being awakened in Alabama. A year ago the Commercial Club of Montgomery took the initiative, and a month ago a standing committee on "Forest Preservation" was created in the state organization of commercial clubs. We had an able representative of the Forest Service present at our annual meeting in November last, and expect now to have him spend the entire month of February in Alabama, stirring up an interest in forest matters.

Most cities awaken to the value of their franchises after they have *given* them all away. So, also, many communities realize the value of their forests only after their land has been stripped of its trees. To the publicity given this work by this Association—to the note of alarm sounded by the Forest Service—we in Alabama are indebted for time and opportunity to protect ourselves.

I differ somewhat from the conclusions reached by Mr. Lippincott yesterday. He spoke of the proprietary interest felt by the general citizenship in any nearby forest; deploring its use for picnics and playgrounds and urging a more rigorous protection of the rights of private property; that vandal trespassers should be taught that the forest is as sound a crop as a golden orange orchard. All this is true; but do not attempt to destroy this "proprietary interest" as a remedy. This very sense of partnership in the forests is the very medium through which the strong influence of the people generally may be crystallized into protective

legislation. The people love the forests. God intended they should. The good Lord gave us a partnership in them, and by virtue of that natural property interest we are enabled to say to forest owners, "You should so manage your forest that its permanent future existence will never be endangered nor its beneficent protection withdrawn from the water powers and fertile fields of the valleys. You should manage your property so as not to injure or endanger the property of others."

The South is vitally concerned in the conservation of her forests and the protection thereby afforded to her many valuable water powers. A great wave of industrial prosperity has swept over the Southland. In the past twenty-five years the capital invested in southern cotton mills (many of which are run by hydraulic power) has increased from \$21,000,000 to \$225,000,000; the value of the crop from \$315,000,00 to \$680,000,000; its production of pig-iron from 397,000 tons to 3,300,00 tons; its production of wool from \$6,000,000 to \$67,000,000; and its lumber from \$39,000,000 to \$250,000,000.

In all this remarkable progress, Alabama has led the march as first in the alphabet of natural resource and development.

Of coke it produced last year about \$8,000,000, being the second state in the Union.

Of ore it produced last year about \$4,500,000, being the third state in the Union.

*Read at Annual Meeting of the American Forestry Association, Washington, D. C., January 16 and 17.

Of cotton it produced last year \$56,000,000, being the third state in the Union.

Of iron it produced last year \$20,000,000, being the fourth state in the Union.

Of coal it produced \$15,000,000, being the fifth state in the Union.

Of pine it produced about \$14,000,000, being the fifth state in the Union.

And yet with all this production of lumber, we have yellow pine timber still standing on about 21,000,000 acres in Alabama.

As has been stated, this is an age of electricity. The forests are the safeguards of our water powers and guarantee a more steady and constant flow. The city of Montgomery runs its street railways and illumines its houses and stores with electricity developed thirty miles distant on the Tallapoosa River. Emerson Marmillon, of New York, has a two million dollar investment in this enterprise. A further project is now under way for the development of another 10,000 or 15,000 horse power further up the river. Other valuable water sites are being secured.

The Coosa valley of central Alabama is a veritable wonderland of rich natural resources. Herein are valuable ore mines, both brown and red; and side by side solid hills of lime rock for fluxing purposes. Herein are over 4,000,000 acres of coal lands—the famous Coosa coal fields; herein are valuable marble and building stone, minerals of various kinds, forests of pine and forests of hardwood; while every vegetable and fruit known to the temperate zone grow luxuriantly therein. Winding beautifully thro' this valley flows the majestic Coosa. You may not be aware, perhaps, that from its rise in the Ostenola River in the foot-

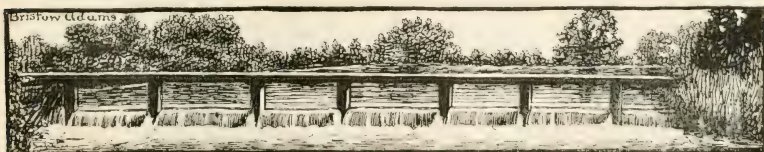
hills of North Georgia to its junction with the Tallapoosa to form the Alabama at Montgomery and thence on down to the gulf, the Coosa River presents the longest system of waterways in the United States, the Mississippi and its tributaries only excepted.

For about one hundred miles of its length it is not navigable, being interrupted by shoals. Along this portion of the Coosa are valuable water power sites. Their permanent protection through forest conservation, and later development, will enable electricity to be supplied to all Alabama and Georgia.

Edison states that we should cease to transport coal in cars to be used in cities for power purposes; but instead establish steam plants at the mouth of the mines and transmit the power itself there generated. It is stated that in California long-distance electric transmission is successfully accomplished over a distance of 300 miles. If this be true, think of the mills and factories this Coosa coal field can electrically supply! We have as yet scarcely scratched the back of our coal fields in Alabama.

If, in addition to the hydraulic power developed on the Coosa and tributaries, we turn the four million acres of coal into electric power at the mine door and transmit it over long-distance wires within a radius of 300 miles, we can supply all the factories and mills, run all the street railways and lighting systems of the cities of the entire southern states for ages.

And, as safeguards for the protection of these water powers, as silent sentinels upon our industrial frontier, the forests of Alabama, properly conserved, will shower rich blessings into the lot of all mankind.



INFLUENCE OF THE WORK OF THE RECLAMATION SERVICE ON THE FORESTRY MOVEMENT

BY

MORRIS BIEN

Consulting Engineer, U. S. Reclamation Service.

ONE of the fundamental purposes of the forestry legislation of recent years is the conservation and regulation of the water supply. In the western half of the United States the water supply is vital. According to the census reports, there are about ten million acres now under irrigation, and a population of several millions is directly or indirectly dependent upon the water supply. The enormous business interests of this great population have not in the past exercised their proportionate influence upon the development of the forestry interests of the public. Considering that they are dependent for their future prosperity upon the proper management of the forests on the public domain, they should constitute an overwhelming force in this movement. It is true that several associations are actively engaged in developing the public interest in the West, but the western people are not in the fore-front of this movement as they should be.

The principal cause of this slow development is inherent in the local conditions. Most of the irrigation systems are constructed by corporations. Even under the best of conditions the enterprises have not been properly managed from an engineering point of view. Construction has usually been begun without adequate preliminary investigations. There are many instances of expensive dams being constructed without the necessary water supply available for storage. Large canal systems have been built without

sufficient water supply to irrigate the lands under them. Dams and canals have been cheaply constructed and improperly located so as to leave them inherently weak and subject to damage or destruction by natural conditions.

The irrigators, consequently, have had an inadequate water supply and have been required to engage in a struggle to maintain their rights to the water claimed by them. The result has been that the canal owners and the water users have been so entirely engrossed in the effort to maintain their systems and defend their water supply against aggression that they have been unable to give attention to the broader aspects of the industry.

The legislation of the western states has to a large extent contributed to this condition. The protection of the law was not needed when the water supply was abundant, but as development extended the laws were inadequate to enable those using the water to protect their rights.

In several of the states legislation has been recently enacted which will improve these conditions. As the irrigators are relieved from the necessity of devoting their whole attention to these fundamentals of possession, they will have opportunity to become interested in the broader views and will take the place among the advocates of forestry protection to which their importance entitles them. This development will necessarily be slow.

There is, however, a new element in the situation. The Reclamation Act

*Read at Annual Meeting of the American Forestry Association, Washington, D. C., January 16 and 17.

was placed upon the statute books about three and one-half years ago. The operations of the Reclamation Service in connection with the work of the Forest Service will add to the movement the influence of two important branches of the governmental service. Aside from the influence of official action itself, there is another phase of the work of the Reclamation Service which will have a marked effect upon the development of the interest in the forestry movement.

The Reclamation Service has begun the construction of thirteen irrigation projects, and will during the next spring begin the construction of ten others. Upon these twenty-three projects there will be expended in the course of the next three or four years about \$30,000,000. One of these projects—a small one—will be practically completed this spring, and another will be so far advanced that a portion of the area can be placed under irrigation. It is expected that 50,000 acres of land will be placed under irrigation this summer. In the season of 1907 the lands under irrigation from projects of the Reclamation Service will be increased to about 350,000 acres; in 1908 the area irrigated will be about 750,000 acres, and in 1909 nearly all of the twenty-three projects now authorized will have been completed to the extent of the first sections undertaken and will provide for the irrigation of about 1,250,000 acres.

This means that during the next three or four years there will be added to the present population of the irrigated area in the West about 20,000 families. Before many years the population supported by this area may easily be several hundred thousand people, and when the lands attain a development such as the irrigated district of southern California has reached in thirty years, will sustain a population of about a million people. In the meanwhile, other projects will be constructed by the Reclamation Service and new additions made to the population.

These people come to the irrigated lands under radically different conditions from those affecting the water users upon existing irrigated areas. The Reclamation Act provides that the Secretary of the Interior shall determine the area necessary for the support of a family on public lands entered under its provisions; shall limit the area to which water can be supplied for lands in private ownership to not more than 160 acres for any one person; and all private land owners are required to reside upon the land irrigated or in the neighborhood. This policy will prevent a monopoly of the land or of the water, the history of irrigated areas showing a tendency toward reduction of individual holdings rather than toward an increase.

When the works are constructed, the Secretary of the Interior is required by the act to turn over to the water users the management and operation of the system, under rules and regulations approved by him. The water users form corporations, known as water users' associations, and provide for the regulation and control of the water systems by themselves, giving each community complete local government.

The Reclamation Act affords opportunity for thorough and careful investigation of the conditions before construction is begun. It supplies ample funds for proper and permanent construction. It eliminates all speculative interests from any control in the system, and turns over to the water users' association a well-constructed system, free from all doubtful questions of ownership or control of the water supply. As a result, the water users' association under each project will be a powerful body representing a united local community, in a position to look into the broader aspects of the irrigation problem. They are usually located close to the forest reserves upon which their water supply depends, and they cannot fail to be a potent factor in the future development of the interests of forest preservation and management.

The reclamation fund provides for the return by the waters users of the cost of construction; so that when the first set of projects now undertaken is completed the returns to the fund will enable the Reclamation Service to extend some of the projects which may be completed and to take up new ones. These extensions will continue indefinitely, because the reclamation fund provided by the act is a revolving

fund. The additions to the communities so developed will go on from time to time, adding their impetus to the progress of the forestry movement.

It is safe to say, therefore, that, aside from the mere official action of the Reclamation Service, the results of the construction of the various projects will introduce a powerful element that will bring into line with the work of the American Forestry Association the united West.

THE NATIONAL BOARD OF TRADE

Interesting Report of the Committee on Forestry
and Irrigation Made at the Annual Meeting,
Washington, D. C., January 16, 17 and 18.

IT IS gratifying to note that much of the legislation on forestry and irrigation matters which has been consistently urged by the National Board of Trade has been enacted into law. The National Board was the first organization representing the commercial interests of the whole country to recommend a national irrigation policy, and June 17, 1902, a national irrigation law was enacted. There is in the irrigation fund at the present time about \$30,000,000, which is increasing from the sale of public lands at the rate of at least \$3,000,000 a year.

In the matter of forest legislation, the National Board of Trade recommended the passage of the bill providing for the consolidation of the various forestry branches of the government into the Forest Service of the Department of Agriculture. This bill was enacted into law at the last session of Congress.

The National Board of Trade has stood against the practice of exchanging worthless "scrip" land in the national forest reserves for valuable public lands outside of the reserves, and has repeatedly recommended the repeal of the law permitting this practice.

This law was repealed at the last session of Congress.

At the last meeting of the National Board, opposition was expressed to what was known as the 640-acre homestead bills, increasing the homestead entry in parts of South Dakota, Colorado and in Montana from 160 acres to 640 acres. These bills were all defeated at the last session of Congress.

Other minor measures and appropriations advocated in past meetings of the National Board, in relation to forestry and irrigation, have been favorably acted upon by Congress.

Much, however, remains to be done. The National Board of Trade has consistently advocated the saving of the great public domain for the use of the real homemaker as against the land and timber grabber and the speculator. Trade and commerce will increase as population increases, and our national land policy should be administered to preserve our remaining half billion acres of public lands for those who will build homes upon them. As laws which tend to overcome this policy the National Board has continuously, since its meeting in January, 1902 urged the repeal of the Timber and

Stone act, the commutation clause of the Homestead act, and the Desert Land act, in accordance with the recommendations of the President in his annual messages to Congress.

A Public Lands Commission, appointed by the President, consisting of W. A. Richards, commissioner of the General Land Office; Frederick H. Newell, chief engineer of the Reclamation Service, and Gifford Pinchot, chief of the Forest Service, has during the course of two years made a study of the public lands' condition and has brought in a report which has been forwarded to Congress by the President with a special message recommending the repeal of the Timber and Stone act and the substitution of a rational forest policy of selling only the stumpage from the public timber lands, retaining the lands for future timber growth; recommending the radical amendment of the commutation clause of the Homestead act and a like amendment of the Desert Land act, in such manner as to require actual residence and improvement under both of the latter named laws, amounting to their practical repeal.

The provisions of this report are highly satisfactory to the forestry and irrigation committee of the National Board of Trade, which believes that their enactment into law, strictly enforced, would do away with land and timber grabbing and promote those policies on this subject for which the Board has consistently striven.

The present indefensible land policy of the United States is resulting in an actual money loss to the government of tens of millions of dollars annually, in the denuding of our watersheds and the destruction of all chances for a future timber supply, in the building up of lordly landed estates in the West of ten and hundreds of thousands of acres in single ownerships, instead of providing for the creating of thousands of small rural homes—in short, in the mismanagement and waste of the greatest resource ever possessed by any nation on earth.

The attention of our lawmakers in Congress should be urgently called to the fact that while they are attempting economy in the expenditure of money, they are allowing laws to remain in force under which by far the most valuable asset of the nation is being recklessly wasted.

The rapidity with which the public lands are being absorbed into private ownership is shown by the following table from the reports of the commissioner of the General Land Office:

Year.	Acres.
1898.....	8,453,896
1899.....	9,182,413
1900.....	13,453,887
1901.....	15,562,796
1902.....	19,488,535
1903.....	22,824,299
1904.....	16,405,822
1905.....	17,056,622

Total for 8 years..122,428,270

Under the Timber and Stone act the sales of public timber lands during the last five years have been as follows:

Year.	Acres.
1901.....	396,445.61
1902.....	545,253.98
1903.....	1,765,222.43
1904.....	1,306,261.30
1905.....	696,677.06

Total..... 4,709,860.38

A large proportion of these lands have been in the heavily timbered belt of the far northwest and is of the class of timber described by the Secretary of the Interior in his report for the fiscal year ended June 30, 1903, in which he says:

"The Timber and Stone act will, if not repealed or radically amended, result ultimately in the complete destruction of the timber on the unappropriated and unreserved public lands. The rapidity with which the public timbered lands are being denuded of their timber, and the opportunity offered under the Timber and Stone act for the fraudulent acquisition of title to

public timbered lands at the uniform price of \$2.50 per acre, when they are in many instances worth forty times that (\$100), has been heretofore set forth in the pages of my annual reports and those of my predecessors."

As far back as 1902 the commissioner of the General Land Office said in his annual report:

"Many lands which the government disposed of a few years ago for \$2.50 per acre are now worth \$100 an acre, or even more."

"Under this law the government has disposed of more than 5,000,000 acres of valuable timbered lands, and has received therefore about \$13,000,000. The law has been too often violated. Individuals without funds of their own have been employed to make entries for others with large capital, and who paid the expenses, and some wealthy speculators have made enormous fortunes."

"Considering the forests simply as property whose only use is to be converted into lumber and other material of commercial value, the government has disposed of them at an actual loss of considerably more than \$100,000,000. In other words, through the operation of this law public property worth much more than \$130,000,000 has been disposed of for about \$13,000,000."

Since that report was made, nearly 4,000,000 additional acres have been disposed of under this law, the value of timber land in the meantime constantly increasing.

But estimating the values only of the 4,709,860 acres of timber lands disposed of in the last five years, and at only \$25 per acre, the government has, in that time, parted with the title to land worth \$117,746,500. The price received for this land has been at the uniform rate of \$2.50 per acre, or \$11,774,650, a loss to the government of over \$100,000,000. Your committee endorses the recommendation of the President and his Public Lands Commission for the repeal of this Timber and Stone act and the substitution of a

rational forest policy, by which the title to the public timber lands shall remain forever in the government, the stumpage only to be disposed of, at its market value.

Under such a plan as this, and under an agreement whereby one-half the proceeds could be devoted to the Forest Service and the other half to the irrigation fund, two policies of great internal improvement and importance could be generously maintained, while at the same time the forestry question would be to a great extent solved, public forest lands being lumbered in such manner as to preserve the young growth and leave the forests as a perpetual source of income to the nation and at the same time conserve the water supply.

If the \$100,000,00 which have been lost to the government under the above showing were at hand, a score or more of enormous irrigation projects could be immediately constructed, reclaiming from 2,000,000 to 3,000,000 acres of desert land, and enormous areas of eastern forest reserves created through the purchase of mountain timber lands east of the Mississippi.

In this connection, your committee is much impressed with the importance of the creation of federal forest reserves to preserve the water supply of eastern streams, upon the continued flow of which depends much of our manufacturing industries. The western half of the United States has over 100,000,000 acres set aside in national forest reserves, as a source of future timber supply and for the preservation of the flow of streams for irrigation; but the East has no such an advantage, whereas the menace to her water supply from forest destruction is equally as great. Large areas in the Southern Appalachian and White Mountain ranges should be created into forest reserves.

In a speech at Raleigh, N. C., on October 20 last, President Roosevelt said: "It is the upper altitudes of the forested mountains that are most valuable to the nation as a whole, especial-

ly because of their effects upon the water supply. Neither state nor nation can afford to turn these mountains over to the unrestrained greed of those who would exploit them at the expense of the future. We cannot afford to wait longer before assuming control in the interests of the public of these forests; for if we do wait, the vested interests of private parties in them may become so strongly entrenched that it may be a most expensive task to oust them. If the eastern states are wise, then, from the Bay of Fundy to the Gulf, we will see within the next few years a policy set on foot similar to that so fortunately carried out in the high Sierras of the west by the national government. All the higher Appalachians should be reserved. Such reserves would be a paying investment, not only in protection to many interests, but in dollars and cents to the government. The importance to the southern people of protecting the southern mountain forests is obvious. These forests are the best defense against the floods which, in the recent past, have during a single twelve months, destroyed property officially valued at nearly twice what it would cost to buy the Southern Appalachian Reserve.

"The maintenance of your southern water powers is not less important than the prevention of floods, because if they are injured your manufacturing interests will suffer with them. The perpetuation of your forests, which have done so much for the South, should be one of the first objects of your public men."

The importance of the Appalachian forest cover to the cotton milling industry alone in the Piedmont regions of North Carolina, South Carolina and Georgia is shown by the statistics of the mills operated by the water power derived from the streams having their sources in these mountains. In these three states there are 163 mills so operated, with a combined capital stock of \$33,000,000, with 2,770,000 spindles and 50,926 looms, and giving work to

over 45,000 employees. The total annual production of these mills is approximately \$64,000,000.

Virginia has interests also which are not included in the above figures, as have also Tennessee and Kentucky, on the western side of the mountains.

A national forest reserve in the White Mountains of New Hampshire is also a matter of general concern and vital to the well-being of the industries of all New England. We are upon the threshold of great industrial competition with the producing powers of the world; to maintain our supremacy we must retain our hold upon our cheap water power, which, through electrical invention, is being utilized as never before and greatly aiding to our national prosperity.

The creation of the Appalachian and White Mountain Forest Reserves cannot be left to the states; the question is an interstate, and therefore a national one. Nearly all the rivers of New England head in the White Mountains of New Hampshire, and it is of supreme importance to the industries of all the New England states, representing tens of millions of dollars, that the forest cover at the river sources shall be preserved and improved.

National delay in the acquisition of these reserves would be dangerous and wasteful. Timber land which a few years ago could have been purchased at \$1.50 to \$3 an acre, has now trebled and quadrupled in value. Additional delay will mean a further increase in cost. Congress should act at once and preserve from destruction one of the greatest resources of the nation.

Committee,

WM. S. HARVEY, *Chairman*,
F. L. HITCHCOCK,
GEO. H. ANDERSON,
F. B. THURBER.

RESOLUTIONS OF THE NATIONAL BOARD OF TRADE.

Resolved, That the National Board of Trade re-endorse the plan of government irrigation of arid lands and their subdivision into small farms of

160 acres or less, the cost of construction to be repaid into the reclamation fund as provided in the irrigation law.

We endorse the broad national work of the Forest Service and the creation of national forest reserves.

We endorse the high, business-like and non-political plane upon which the Reclamation Service and the Forest Service are being conducted.

We endorse the fearless course pursued by and the manifest rigid integrity of the Secretary of the Interior in his prosecution of public land thieves and timber grafters, and congratulate the country upon the success of his endeavors to purge the nation of those who would rob it of one of its best assets.

We urge upon Congress the immediate enactment of legislation to carry into effect the recommendations of the President as set forth in the report of the Public Lands Commission (being Senate Document 154, 58th Congress, Third Session), to the end that the Timber and Stone act be repealed forthwith and a forest policy substituted providing for the sale of stumpage, at market value (the title to government forest lands to remain forever in the government), the net proceeds therefrom to be divided equally between the Forest Service and the Reclamation Service, the latter of which now receives the entire receipts from the sale of government timber lands in the arid states and territories; that the commutation clause of the Homestead

act and the Desert Land act be repealed, or so amended as to require long terms and actual residence and improvement, the predominant idea being that no more public lands shall ever pass from the government except for the purpose of actual and bona fide home-making in small tracts, not to exceed 160 acres each.

We invite the attention of Congress to the vital importance of creating forest reserves in the Southern Appalachian and White Mountain regions for the preservation of both timber and water supplies, and we urge an immediate appropriation of at least \$3,000,000 for the purpose of reserves in the Southern Appalachian Mountains and in the White Mountains of New Hampshire.

Members of the National Board of Trade are urged to use their personal influence with their representative senators and representatives for the repeal of the Timber and Stone act and for the passage of the bills for national forest reservations in the Southern Appalachian Mountains and in the White Mountains, and to influence the press favorably to these measures in their respective cities and states.

It is further Resolved, That copies of these resolutions and accompanying report be sent to the President, Secretaries of the Interior and Agriculture and to the members of the public lands committees of the United States Senate and House of Representatives.



Forestry and Irrigation

H. M. SUTER, Editor

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JOHN

F. SHERIDAN



Steam Shovel and Derrick Cars in Operation on Big Cut at Station 300 on Inlet Canal, Belle Fourche Project, S. D.

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NEWS AND NOTES

Meeting of Directors

A meeting of the Board of Directors of the American Forestry Association was held in the office of the president, at the Department of Agriculture, Washington, D. C., Tuesday, February 6. After election of officers plans for the year's work were discussed and adopted, and referred to the newly-elected executive committee for action. This committee is composed of Mr. Gifford Pinchot, Mr. William S. Harvey, Mr. F. H. Newell, Mr. James H. Cutler, and Mr. William L. Hall. A budget estimate of receipts and expenditures for the fiscal year of 1906 was presented by the treasurer. A statement by the secretary showed that 302 new members were elected during the month of January. It was decided to hold meetings of the Board of Directors quarterly, in January, April, July, and October.

Awakening Interest in South

Mr. Alfred Gaskill, of the Forest Service, is spending the month of February in Alabama, in meeting and addressing farmers' conferences and commercial bodies, to awaken an interest in forestry. Though the Southern States are now the center of the Eastern lumber industry, and though the Southern forests are destined to play so important a part in the economic development of the region, the true importance of these forests and their great possibilities have by no means been grasped. Already great inroads have been made on Southern forest resources, and if the story of waste followed by useless regret which is told of the Northern forests is not

to be repeated in the South, it is imperative that the public mind be roused and that steps be taken in time to check exhaustion of supplies, before it is too late, by calling in the services of forestry. Alabama, singularly rich in forest resources, is still fortunately in a position, by taking thought, to add vastly to her industrial growth through the wise utilization of these forest riches.

Storage Tests of Seeds

Numerous packages of forest tree seed are being received by the Forest Service in Washington from the several nursery stations throughout the West where seedlings are being grown for planting on forest reserves. These seeds will be used in carrying on extensive storage tests to determine the best methods of preserving seeds of the several species most commonly used. The more important species are western yellow pine, jack pine, Coulter pine, knobcone pine, red fir, white fir, and incense cedar.

The work in Washington is in cooperation with the Seed Testing Laboratory, and the seeds will be stored dry, in cool basements, in cold storage, and in hermetically sealed jars. Corresponding tests will be carried on at the nurseries on the western forest reserves, and the comparative results are expected to show not only which method of storage is best, but in which locality seeds retain their vitality longest. In view of the rapid increase in forest planting operations, particularly in connection with planting on denuded watersheds, this work becomes of high importance.

**Reform in
Turpentine**

Now that experiment has shown that the productive life and the total crop of turpentine trees may be prolonged by reducing the size and depth of the wound made in chipping, the Forest Service, as the next step, has taken up the best means of accurately regulating the chipping so as to make it uniformly of the right depth and height. In the present method of hand chipping there is a good deal of variation in the work of different men. To obviate this, an instrument is being devised by means of which exact chipping may be done. By this means it is hoped to give much greater certainty to the increased yield and greater total profit which the recent experiments have shown to be possible under an improved system of chipping.

**Combating
Damage
by Rabbits**

During the winter the damage caused by rabbits to trees set out by the Forest Service on watersheds in reserves in southern California, will be met by the adoption of measures recommended by Dr. C. Hart Merriam, Chief of the United States Biological Survey. The trees have many hard conditions to contend with. The thin soil and extreme aridity are trying enough, and of late rabbits have been eating off the young trees of certain species. Knobcone and Coulter pines are favorites with the rabbits, while incense cedar is not touched. By using large seedlings and making a proper choice of species the injury done by the rabbits is to some extent obviated. But stronger measures are needed. Those to be tried will include steel traps set in the regular run-ways that the rabbits frequent, poisoned grain, and the wetting with strychnine syrup of the branches of those seedling which the rabbits injure.

**Timber
Testing**

The timber-testing machinery which the Forest Service will use at the laboratory of the University of Washington, at Seattle, has arrived, and Mr. Rolf Thelan, the assistant as-

signed to the timber-testing work there, will go to Seattle to put the machines in operation. The Seattle laboratory is one of three on the Pacific Coast at which the Forest Service is conducting tests of the strength of the structural timbers of the region. The two other laboratories are at the University of California and the University of Oregon, which, like the Washington State University, are co-operating with the Service.

**Planting
in Prairie
Regions**

The success of the planting operations on the Dismal River Forest Reserve in Nebraska has indicated to ranchmen in the sand-hill country the advisability of planting for protection and timber supply. The jack pine and western yellow pine are very promising, and, in addition, certain of the rapid-growing broadleaf trees, such as Carolina poplar, green ash, and cottonwood, can be used.

In the spring of 1904 some ten or a dozen ranchmen planted small quantities of jack pine obtained from the woods of northern Minnesota on trial. Authoritative reports from nearly all of these men show a high proportion of success, only two absolute failures being reported, and these because of unfavorable local conditions and lack of care.

The Forest Service has recently received an application for assistance in planting ten acres near Broken Bow, and it is expected that the applications from ranchmen will rapidly increase in the future.

**Progress on
Umatilla
Project**

Officials of the Reclamation Service in Washington are much pleased with the progress being made by the land owners on the Umatilla project, Oregon. Late advices from the engineer on the ground indicated a strong interest on the part of the water users who have already pledged 13,000 out of 18,000 acres included in the project.

As most of the legal difficulties have been adjusted by the Secretary of the Interior, it is believed that no great

delay will occur in signing up all of the land embraced in this project. Although the Umatilla is one of the minor national works in point of cost and acreage, the favorable climate, low altitude, the fertile soil and its adaptability to a very wide variety of products, makes this one of the most attractive projects undertaken.

The land is best suited for orchards and small fruits, and when so used from 10 to 20 acres are ample for the

tered, and predict a populous and prosperous community here at no distant day.

City Park Forestry

The Forest Service has submitted to the Improvement Society of Helena, Montana, a detailed plan for forest planting on treeless portions of Mount Helena, which lies on the outskirts of the city. This plan, in general, covers the collecting and storing of the necessary tree seeds, growing



Diamond Drill on Barge in Shoshone River at Dam Site, Shoshone Project, Wyoming

support of a family. The fruit and vegetables are the first on the market. The transportation facilities are excellent, the markets being the large cities of Portland and Spokane.

The engineering works are simple, and while the cost of water is \$60 per acre, it is relatively low compared with the values produced. The soil experts who have thoroughly examined the whole area are enthusiastic concerning the future of this section when wa-

the stock in a nursery, and planting the trees in the park. The proposed park contains about 900 acres, of which about 140 acres are already covered with young timber.

North Dakota Reclamation

The Secretary of the Interior has set aside from the Reclamation Fund the sum of \$450,000 to be used in connection with the \$550,000 already allotted for pumping projects in North Dakota, for initial installation on the

Nesson, Williston, and Buford-Trenton projects, upon the following conditions:

First: That the land owners pledge themselves in the usual way through the water users' association, to return the cost to the Reclamation Fund.

Second: That the holdings of private lands in excess of 160 acres for which water is to be furnished be disposed of in tracts not exceeding 80 acres of irrigable land.

Third: That the owners of irrigable lands in excess of 160 acres be required to dispose of them in the manner provided by the general form of contract for this purpose and approved by the department.

Klamath Project The Secretary of the Interior has authorized the Supervising Engineer of the U. S. Reclamation Service, at Los Angeles, California, to receive sealed proposals for furnishing from 8,000 to 10,000 barrels of Portland cement, for use in connection with the Klamath irrigation project, Oregon and California.

Particulars may be obtained by application to the Chief Engineer of the Reclamation Service at Washington, D. C., or to the office of Supervising Engineer J. B. Lippincott, 1108 Union Trust Building, Los Angeles, California.

Payette-Boise Project The construction of the Payette-Boise reclamation project will begin at a very early date. At the present time the Secretary of the Interior is advertising for bids for 14,000 barrels of Portland cement, to be delivered f. o. b. cars at stations within a radius of twenty-five miles from Nampa, Idaho. These bids will be received by the Supervising Engineer at Boise, Idaho, until 2 o'clock, March 9, 1906.

Reclamation in New Mexico and Texas On December 2, 1905, the Secretary of the Interior allotted the sum of \$200,000 from the Reclamation Fund for the immediate construction of the

Leasburg diversion dam and canals in connection with the Rio Grande project, New Mexico and Texas, on the condition that the return of said sum be guaranteed by the land owners. The prescribed conditions of repayment in two years having been found impossible of fulfillment by the owners of lands, the Secretary has rescinded this requirement and directed that the usual form of contract be entered into with the water users' associations guaranteeing the return to the government of all expenditures made under the terms of the Reclamation Act, which allows for ten equal annual payments.

The Reclamation Fund The present status of the Reclamation Fund, composed of all moneys received from sales of public lands in certain states and territories, is shown in the following table:

State or Territory.	Reclamation fund, by States received in 1905.	Total Reclamation fund.
Arizona	\$30,368.46	\$216,772.32
California	498,488.37	2,470,396.58
Colorado	318,546.14	1,909,713.70
Idaho	383,221.74	2,028,731.29
Kansas	39,423.91	128,273.49
Montana	349,529.75	2,098,532.65
Nebraska	179,138.10	657,109.52
Nevada	11,167.70	59,321.11
New Mexico....	133,243.57	533,445.83
North Dakota...	807,792.48	4,213,892.62
Oklahoma	490,629.78	3,042,767.11
Oregon	610,797.39	4,841,457.14
South Dakota...	217,688.34	960,468.94
Utah	77,662.81	380,013.84
Washington	451,773.36	3,187,136.34
Wyoming	193,045.49	1,070,299.37
Total	\$4,805,515.39	\$27,818,351.85

Reclamation Work—River Improvement Many prominent writers in the Mississippi valley seem quite unable to understand the difference between the appropriations made for the reclaiming of arid lands and those for the improvement of rivers and harbors. There is a disposition to criticise Congress for permitting the expenditure of millions in making habitable and

productive vast areas of the public domain now worthless, and at the same time cutting down the appropriation for work on our national waterways.

Apparently the fact has been overlooked that Congress has never made an appropriation of any specific sum for reclamation. On June 17, 1902, a law was passed setting aside the proceeds from the sales of public lands in certain western states and territories for the construction of irrigation works within their borders. The law at the same time provided that every dollar so expended should be returned to the government by the settlers who take up the lands reclaimed. In other words, the nation made an advance of the receipts from the sales of certain public property to make marketable other public property. Out of the many millions expended by the government in river and harbor improvements, not a cent has ever been returned directly to the Treasury, nor was it expected that any return would be made.

The difference in the two kinds of appropriations here mentioned is so obvious, however, that comparisons for the purpose of criticism are unfair. The western beneficiaries under the Reclamation act are suggesting that if the sections so strenuously demanding appropriations for river and harbor improvements would indicate a willingness to reimburse the government for these expenditures, Congress might be more inclined to favor their demands.

Testing Red Fir

The mechanical tests of red fir, which the Forest Service has undertaken in co-operation with the University of Oregon, are now under way. Mr. J. F. Knapp, of the service, reports from Eugene, Ore., that the necessary machinery and accessories needed for the tests have been installed in the laboratory. The object of the experiments will be to determine accurately the effect of knots and other defects upon the strength of large sticks of red fir, with a view to furnishing data which

may be used for the inspection and improvement of specifications.

The material for the tests is to be selected from the mills of a lumber company near Eugene, and will consist of sticks 8 by 16 inches and 5 by 8 inches in cross section. The sticks will be mainly merchantable and seconds, according to the Pacific coast standard rule for grading, but will include a few "selects" of a rate of growth corresponding to the sticks containing defects. Most of them will be tests green, but an occasional specimen will first be air-dried.

Forest Cover on Water Sheds

That the value of forest cover on watersheds used for power and irrigation is now realized and fully appreciated is strikingly shown in southern California, where the Pacific Electric Company has asked the Forest Service to make a preliminary examination of the watershed of the San Luis Rey River in San Diego county, which they plan to develop. The waters of the San Luis Rey River now run to waste; but by constructing flood and storage reservoirs and reforesting the denuded slopes, enough water can be developed to furnish electric power for a new system of suburban trolley lines in the vicinity of San Diego and connecting that city with Los Angeles. Besides furnishing this electric power, the water, after it passes through the turbines, will be used for the reclamation of the lower valley of the San Luis Rey River. The preliminary work of the Forest Service will be to examine this watershed and ascertain the portions in need of reforestation, and to outline the general procedure in preparing a definite plan for forest planting on these areas. Mr. G. B. Lull, who is now stationed at Los Angeles, will do this preliminary work.

Land Withdrawals Effective

The attorney general of the Department of the Interior has decided that the lands within the former Ft. Buford Military Reservation, which are included in the area withdrawn for the Lower Yellowstone project, are not

subject to disposal under the act providing for the disposal of abandoned military reservations.

These lands were restored to the public domain by the act of May 19, 1900 (312 Stat., 180), which provides that they shall be subject to disposal under the homestead, townsite, and desert land laws. It provides that the actual occupants thereon upon the first day of January, 1900, shall have a preference to make one entry not exceeding one quarter section; that lands occupied for townsite purposes and lands shown to be valuable for coal or minerals shall be subject to entry and sale under the townsite, coal and mineral land laws, respectively.

The practical effect of the act of May 19, 1900, was to restore the land to entry under existing laws, except such laws as are not specifically named. These lands are, therefore, subject to withdrawal under the Reclamation Act as portions of the public domain which are subject to entry under the general land laws. The withdrawal made by the Reclamation Service is therefore effective and all the lands included and entries thereof are subject to the limitations and restrictions of the Reclamation Act.

Telephones in Forest Reserves Since July 1, 1905, the Forest Service has approved the construction of 154.65 miles of telephone lines through various forest reserves. In so doing, the service has arranged, in all cases, to secure to forest officers the free use of these lines.

Now that the telephone is recognized as one of the best safeguards against the spread of forest fires, this arrangement means greatly increased safety to the reserves, secured without expense. By the continuance of the policy, it is believed that in due time a full and adequate telephone system will be built up on the reserves, to the great advantage of the service.

Underground Waters of Great Plains Very widespread interest is being taken in the investigations the Reclamation Service is making of the feasi-

bility of developing the underground waters of several portions of the Great Plains area. It is recognized that if the Garden City project in Kansas proves a success that private capital will immediately take up the work in other sections. There are many people in the east, especially in the New England states, who are deeply concerned in this work.

During the days of the "rain-belter" a great wave of immigration swept over vast areas of western Kansas and Nebraska. For a year or two rainfall was abundant and prodigious crops were grown. Easterners, allured by the high rates of interest, invested their savings in mortgages on these farms. A cycle of dry years came, the settlers vanished, and the mortgages were foreclosed. A considerable amount of this land is still the property of New England school teachers, merchants, and farmers, and their interest in a proposition of reclamation is obvious.

A large part of the Great Plains area is underlaid with a thick stratum of water-bearing gravel. The investigations of the government show that the water supply is enormous, and if it can be cheaply lifted into distributing ditches, will insure the reclamation of many thousands of acres of land of exceptional fertility.

The government project in Kansas is a small one, only 9,000 acres; but upon its successful operation may depend the future development of an area equal to several eastern states.

Studying Gum

Mr. H. B. Holroyd, of the Forest Service, is in Louisiana at the request of the Southern Cypress Manufacturers' Association, to make a preliminary study of the conditions necessary for the seasoning of tupelo gum, with which manufacturers have not a little difficulty, owing to the tendency of this wood to warp and twist. Though of a distinct genus, tupelo gum shows much similarity in this respect to red gum, which for some time offered much difficulty in the process of dry-

ing. Indeed, red gum has only recently been handled with sufficient success during seasoning to render it a reliable wood. It is believed that with due care the troubles with tupelo gum may be overcome as successfully as has been the case with red gum, with regard to which the Forest Service recently published a bulletin dealing both with the commercial uses and with the mechanical properties of the wood.

not quite, four billion feet of standing tupelo on the lands of the association.

Foresters for Reserves

It is the intention of the Forest Service to add a trained forester to the executive force of each forest reserve. This is to introduce practical forestry on all the reserves. In addition to his general duties he will act as a technical assistant in mapping, estimating,



Detail View of Complete West Entrance of Tunnel just below Shoshone Dam Site on Canyon Road, Shoshone Project, Wyoming

Tupelo gum occurs through the coastal region of the Atlantic states from Virginia to northern Florida, through the gulf states to Texas, through Arkansas and southern Missouri to western Kentucky and Tennessee, and to the valley of the Wabash River. It grows only in swamps and wetter situations, often in mixture with cypress and, in rainy seasons, stands in from six to twenty feet of water. There are said to be almost, if

and disposing of the timber. For this purpose the following appointments of forest assistants have just been made: R. P. Imes, to assist Supervisor Seth Bullock in the Black Hills Forest Reserve in South Dakota and Wyoming; E. H. Hereford, to assist Supervisor Fred S. Breen in the Black Mesa and Grand Canyon Reserves in California; and A. R. Powers, to assist Supervisor L. A. Barrett in the Plumas Forest Reserve, California.



Cascades near Head of Catawba River.

There are hundreds of Cascades as beautiful as this in the Southern Appalachians. As long as these mountain forests are preserved these streams have a regular flow; united they furnish the water powers which operate the factories valued at increasing millions.

INDIVIDUAL RESPONSIBILITY vs. COMMISSIONS*

How Methods in Vogue Under National Reclamation Act could
be Adapted to Advantage in Construction of the Panama Canal

BY

HON. FRANCIS G. NEWLANDS

United States Senator from Nevada.

I THINK it is conceded by all men connected with great corporate enterprises that the responsibility of a great work must be individual; that it must be put upon one man; that that man must appoint his assistants for the different branches of the work and hold them responsible to him, and that these assistants in their various areas of control shall pursue the same method.

At the very start we did not individualize this responsibility. It is true we intrusted the work (of constructing the Panama canal) to the President but instead of giving him a free hand in organization we instructed him that he should do this work through a commission, and we ourselves designated in great part the personnel of that commission. We provided for a commission of seven. I think that was a mistake. I think we should have put upon the President of the United States the responsibility for this work; that we should not have permitted him to share that responsibility with any commission of this kind. We should impose upon him the duty of appointing his own subordinates, individualizing responsibility everywhere as far as possible.

It is not to be wondered at that we should make mistakes in organization at first, for the United States government has not been accustomed to great works of construction. We are now entering upon an era of construction, and I believe the area of our work in

that particular will increase until it finally embraces governmental public utilities which are not now dreamed of.

The only other great work of construction upon which we have entered was entered upon under a law passed almost simultaneously with the act under which the President is acting, and that was the irrigation law. There we individualized responsibility. We shaped a most comprehensive bill; provided a fund from the sale of public lands through which construction should be conducted, and provided a revolving fund so that the money could be used over and over again as the lands reclaimed were sold.

But he gave the Secretary of the Interior full power to execute the law, and he placed no limit upon that power except that he should not make a contract for construction unless the money for its payment was actually in the fund.

What did the Secretary of the Interior do under that act? He referred the administration of the act to the Geological Survey, a scientific branch of the government which for years has been engaged not simply in geological research, but in the study of everything that relates to the topography and resources of the country, to our mineral deposits, to the measurement of streams, to the control of streams for navigation as well as irrigation, and which, during the formative process of the irrigation agitation, had been engaged in making plans for the

*From a speech delivered in the United States Senate, Dec. 16, 1905.

great work that was subsequently to be entered upon.

The director of the Geological Survey has demonstrated administrative capacity of a very high character. Although his special scientific specialty was the examination of fossils, yet the expanding area of his bureau had turned him gradually into a great administrator. His capacity has been recognized by Congress, by our appropriations committees, and by all who

the responsibility of their acceptance or their rejection.

Under him is Mr. Newell, a graduate of the Massachusetts Institute of Technology, a man who entered the service when he was very young, an enthusiast on the subject of irrigation, and who during fourteen years' patient investigation and patient work has been preparing for this great work of construction. Those are the two men upon whom the responsibility for this work centered.



Hon. FRANCIS G. NEWLANDS

United States Senator from Nevada, one of the foremost exponents of National Irrigation.

have been brought in contact with him by a prompt acquiescence in almost everything he has asked. He has been termed in this body the greatest getter of appropriations in the service of the government, and he has been direct and straightforward, has presented his plans clearly, and without urgency, and has placed upon the committees of the Senate and the House themselves

Now, what did they do? Select commissions to divide responsibility as to administration? Not at all. They drew into the force gradually the men who had distinguished themselves all over the country as topographers, as hydrographers, as hydraulic engineers, as constructing engineers, and the result is that today we have in the employment of that service a number of

scientific men of large practical experience, a body that is unsurpassed by that in the employ of any other government in the world.

Now, let me say right here that it seems to me that the Panama canal involves the same problems that are involved in the construction of irrigation works. You may call it a simple problem as compared with the construction of all the irrigation works that are contemplated in this country. The work of investigation and planning now embraces fourteen states in this Union. The topography of the country has been studied, stream measurements have been made, surveys of canals and ditches have been made, dams have been planned, reservoirs have been provided for, and they are almost ready for construction, and some are already commenced, and some have been finished. The Panama canal involves the same work. What have you there? A line only forty-seven miles long. The irrigation work embraces the entire arid region, consisting of thirteen states and three territories. The canal is forty-seven miles long. As you proceed from Colon, the canal runs through a flat country for fifteen or sixteen miles, the government availing itself for a part of that distance of the Chagres River as a part of the canal. Then comes the Bohio dam, 80 feet above the surface of the land, and about 150 feet down to bed rock. Then you have this artificial lake as the result of the dam, which is to receive the flood waters of the Chagres and hold them, so that they will not tear the banks of the canal below.

Then we have the reservoir reinforced by other reservoirs upon the Chagres River, intended to control the violence of the stream. The Bohio reservoir is about 14 miles long. With 15 miles of the canal through the almost level plain to Bohio and the 14 miles of the Bohio reservoir you have a distance of 29 miles of the 47 miles completed. Then, farther to the south, you have the Culebra cut of about 10

miles, which is to be cut to a depth of from 66 to 80 feet, according to the number of locks employed. Then you have another level space, or almost level space, to the Pacific ocean, about 8 miles, making in all about 47 miles.

Now, this service involves exactly the same problems on which the employees of the irrigation service have been engaged for fourteen years. It involves study of the geological formations, careful stream measurements through a series of years, so as to ascertain the extent of possible floods and prevent the destruction caused by such floods. It involves dam construction, ditch construction, and canal construction, just as in the arid region, and it involves protecting canals.

Now, let us see whether it would not have been wise for the President to have had a free hand to take hold of this scientific branch of the government, which is an evolution of fourteen years, which had an administration already accomplished whose experience covered these various problems, instead of reaching out for a new administration, to be accomplished not by the aid of hydraulic engineers, but to be accomplished by the aid of railroad engineers inexperienced in hydraulic engineering.

The Bohio dam is about 80 feet high above the surface, though its foundation is to go down 150 feet to bed rock. Its length is 3,800 feet. That is a very long dam, of course, but at the Salt River in Arizona the United States government is now constructing, under the Reclamation Service, a dam 270 feet high and 800 feet in length. It is also constructing the Shoshone dam, 310 feet high, with a length of 200 feet. It is constructing the Rio Grande dam, 255 high, with a length of 1,150 feet. That dam is to be constructed at a total cost of \$5,115,000 whilst the Bohio dam at Panama will cost about \$6,000,000.

Now, I ask, would it not have been better to have intrusted this work to that branch of the government which has been built up through the slow

process of evolution and which has now in its corps, either by direct appointment or as consulting engineer, every man in the country who has distinguished himself in hydraulic engineering.

Then as to tunnels. The irrigation service is now constructing the Gunnison tunnel, of a length of 6 miles—a tunnel 10 by 12 feet—and of that tunnel a mile is already completed. Recollect that the irrigation act was passed almost in the same month that the Panama act was passed. The irrigation committees of the Senate and the House visited the various projects during the last summer, and we had opportunity of observing the quickness and extent of the work, and we were amazed at the progress that had been made in the short space of three years.

At the same session of Congress a bill was passed for the construction of a post office building, to cost fifty or sixty thousand dollars, in the city of Reno, Nevada. That building is not yet constructed—the foundations are not yet laid; and yet the Reclamation Service has during the intervening period expended over \$2,000,000 in reclamation work in Nevada; has diverted the Truckee River, a stream of floods during certain seasons of the year, a distance of 30 miles by a new river over into the Carson valley; has constructed dams and locks and all the hydraulic machinery that was necessary to make that enterprise effective, and the water is now being turned out upon the soil.

Now, what salaries are paid these men? Mr. Walcott receives \$6,000 a year. He could, in my judgment, because of the value of his services as an administrator, get a very much larger sum in outside employment, but he feels, as I observe most government employees do, and particularly those relating to the scientific branches of the government, a personal pride in his work. The commercial spirit does not entirely possess the men who are in the employ of the Geological Survey. They are content with reasonable

compensation, and you could not tempt them from government employ by the offer of larger compensation.

I know one distinguished engineer who has been employed in the great private enterprises of the West in irrigation construction who accepted from the United States government a salary about one-third that which he earned in private practice, and he accepted it because he wished to identify his name with a great engineering work in which he was interested. The *esprit de corps* of this particular branch of the service is most marvelous. We men of the West have had opportunities of observing it. We have every year in the West an irrigation congress, composed of about a thousand men, deriving its membership from each one of the arid and sem-arid states. The last congress I attended was in El Paso. The one previous to that was at Ogden. This convention of a thousand men was attended also by the engineers and hydrographers and the expert men of the Reclamation Service. They have annually a congress of their own, in which these engineers, coming from various parts of the country and engaged in different projects, present to the judgment of their associates in the congress their several projects, invite criticism, and ask judgment. To these conferences members of the irrigation congress were invited, and the result is they have been a great educational power in the West. Forty or fifty delegates from every state who attend that congress go back to their states familiar with the plans of the government. They become informed through these expositions that take place and they form an educational force in every state, and, so far as the engineers are concerned, they feel the sustaining power of the people themselves in that great work.

Now, this demonstrates that the government can get men for much less compensation than obtains in commercial life. Mr. Walcott gets \$6,000 a year; Mr. Newell gets \$5,000, and he

is chief engineer, and no one of the noted engineers under him gets, I believe, more than \$4,000 or \$4,500. The salaries of the engineers range from \$2,200 up to \$4,500. The only exception is Mr. Grunsky, formerly of the canal commission, who has been assigned by the President to the position of consulting engineer, at a salary of \$10,000 per annum.

It would have been very easy, simply by an extension of this service, to have taken the Panama canal within the area of its work, involving exactly the same problems that this bureau has been devoting itself to for fourteen years, and in which it has accumulated an experience that no set of men, however great their capacity, can acquire in a short time.

I do not question the ability of the engineers who have been employed in this work, but I do contend that almost all of them—I may say all that have been brought to my attention—have been engaged in railroad construction and not in hydraulic construction. Railway engineering is comparatively easy. It consists simply in surveys of the right of way, in adopting a certain standard of grade, in constructing tunnels and bridges across streams; whereas hydraulic engineering, as conducted in the West, involves all the things that are embraced in the construction of the Panama canal, except possibly the question of sanitation.

Now, let me show what the Reclamation Service has done during these three years. It has built 77 miles of main canals. These main canals have the size of rivers. You would be amazed at the magnitude of some of those works. It has built 50 miles of distributing canals. It has built 186 miles of irrigating ditches, 150 miles of telephone, 125 miles of road in canyons, involving deep rock cuts; $3\frac{1}{2}$

miles of tunnels. It has excavated 10,000,000 cubic yards.

In one of their works, at the great Salt River dam, a dam which is to be constructed of cement and stone, they found they were held up by the cement trust. What did they do? They set their geologist to work, and the geologist discovered very near the site of the dam material admirably suited to make cement. And so they put up, at a cost of \$100,000, a Portland cement mill, and there they are making cement at a great saving to the government. I cannot recall exactly the figures, but it is a very large sum.

Work is now going on in eleven different projects in as many different states, and they are now constructing the Shoshone dam, the Pathfinder dam, the Roosevelt dam, the Laguna dam, the Belle Fourche dam, the Gunnison tunnel (6 miles long), and 12 miles of ditches on the Colorado River.

So this service is moving along quietly, unobtrusively, in a businesslike way, under this system of individual responsibility. Mr. Newell, the chief engineer, is responsible to Mr. Walcott, the director of the Geological Survey, and Mr. Walcott, the director of the Geological Survey, is responsible to the Secretary of the Interior; and I believe that this work will be one of the crowing glories in the history of this republic.

But even if the service of the irrigation survey should not be employed, even if its accumulated experience and information should not be tapped in this way in this work of identical character, it does seem to me that we should give the President of the United States a free hand, so that he can, if he chooses, turn over this work to the Geological Survey, or so that he can, if he chooses, adopt the system of individual responsibility to which I have referred.



THE RISE IN LUMBER PRICES*

BY

R. S. KELLOGG

U. S. Forest Service

OURS is pre-eminently a wood-using civilization, and aside from food and clothing, no material is so essential to industrial progress as wood. Nature provided us with immense areas of easily accessible, highly valuable forests, and we have drawn upon them with so lavish a hand for every conceivable purpose that we are loath to believe that the time is rapidly approaching when our remaining forests must be handled *constructively* and not *destructively*; or else wood of the higher classes will be obtainable only in insufficient quantity. According to the Census of 1900, which was admittedly incomplete, we were then using annually thirty-five billion feet of lumber, and now the amount is probably nearing fifty billion feet. Yet how many of you ever stop to consider that the lumber cut is much less than half of the total annual drain upon our forests? The pulp mills take some 2,000,000 cords of wood yearly, the tanneries 1,500,000 cords of hemlock and oak bark, the cooperage industry a vast amount of timber, the railroads about 115,000,000 ties for renewals alone, and then there are millions of posts and poles to be added to the total before we even come to the half of our wood consumption. The Census of 1880 showed that the wood used for fuel, at that time, amounted to 146,000,000 cords, and there is no reason to suppose that, despite the great increase in coal consumption, the 85,000,000 people of 1906 are burning less wood than did the 50,000,000 of 1880.

All these items, huge though they be, belong to necessary demands upon the forest. We are a rapidly growing

nation, and we have seized upon every available resource to aid in our growth. Though the forests have been destroyed, they have yielded rich returns. Yet there is another drain upon them, which has been wholly harmful. This is fire. As a single example: The Secretary of the Pacific Coast Association recently stated that during the last fifty years there has been 900,000 acres more timber burned over than cut over in Oregon.

In the early days New England was the great lumber region. Then came the Lake States with their supposedly "inexhaustible supply" of timber. This was said 30 or 40 years ago. Now, Michigan is a practically negligible factor in white pine. Wisconsin is on the wane, and it will not be many years until Minneapolis and Cloquet cease turning out a million and a half feet each daily during the sawing season. Southern yellow pine is at present furnishing in the neighborhood of 30 per cent of the total lumber supply, but it in turn will yield to the Pacific Coast woods; and we have finally come to the realization that the so-called "inexhaustible supply" is a pleasing, but most dangerous misconception. Exploitation has been so easy, invention has supplied so many ingenious methods of converting trees into lumber, that the output from a given region is maintained at a high level until the supply is close to the point of exhaustion. We are nearer a halting place than most of us realize.

What is the condition confronting the lumberman and the user of his products to-day? Dr. Fernow states that an "extravagant estimate" of our stumpage is not over two trillion feet,

*Paper read at the sixteenth annual meeting of the Southern Lumber Manufacturers' Association at New Orleans, January 23, 1906.

standing on some 500,000,000 acres. At the present rate of sawing this will be cut in forty years. This does not mean that forty years hence there will be no more timber to saw, but it does mean that there must come a great readjustment to new conditions by both the manufacturer and the user of forest products. So far we have been drawing on the *older* trees in our forests, or cutting virgin stands anywhere from 100 to 500 years old. In other words, we have been paying dividends out of our capital stock, and no good business man will do that. In the near future our wood must be supplied by growth and reproduction, and the now commonly despised "second growth" will come to be our source of supply.

Going back to our estimated forest area of 500,000,000 acres, let us see what can be done with it. Of this 500,000,000 acres, the government has nearly 100,000,000 acres in national forest reserves, but a considerable portion of this area lacks forests of any value for lumber. Four-fifths of our forest area is in private hands and quite likely will remain so for at least a long time to come. The highly managed forests of Germany grow, on an average, about 50 cubic feet of wood per acre annually. Were our forests in the condition of the German forests, their extent is barely sufficient to furnish by annual growth the amount of wood we now use. As a matter of fact, the annual growth of our forests as a whole, under present conditions of abuse, is probably not more than one-fifth that of the German forests.

These, then, are the conditions as nearly as can be estimated to-day. It does not require any special gift of prophecy to outline what will follow. We will undoubtedly go on in the same old wasteful, extravagant way, for some years yet, until there comes a stern realization that things must change. And when I say a "stern realization," I mean one which is caused by a greater scarcity of stumpage and a much higher price for lumber than now exists. Then we shall begin to

husband our resources, and make one board do where we now use two. Undoubtedly, we are approaching the maximum of our annual consumption of forest products, and hereafter, the great increase will be in *value* instead of *quantity*. It is entirely possible for us to use less wood and we shall do so when we have to. We are consuming some 500 board feet of lumber, per capita, annually, where Europe uses but 60; and if we were forced to import 80 per cent of our wood supply as does France, or practically all, as does England, we should quickly learn how to economize. We are not likely to reach this extreme condition, but we may be sure that prices will advance until consumption is finally forced down to somewhere near the annual accretion of the forests that are left at that time.

I do not decry high prices, much as the country has benefited by low prices for lumber. I recognize the fact that in general the lumbermen have operated as economically as they could under prevailing conditions, and while it is fashionable to condemn them for destroying the forests, they have done so only because of economic demand, and their critics would have behaved no better under the same circumstances. But the forests will not be handled rationally until they become valuable, until there is money in handling them that way; and so I say that from the standpoint of the forester, high prices for lumber are a good thing, because they make it profitable to utilize the forests rationally and economically. One of the prominent Pacific Coast lumbermen recently advised his associates to "slab lightly, reduce your saw kerf, and keep your eye on the burner." Carrying this a little further, it will not be long until the slabs are resawed and the burner abolished entirely, as the white pine manufacturers are now doing.

In view of these conditions, there is nothing really surprising in the fact that in the last twelve years the price of rough white pine uppers on the

Buffalo market has risen from \$47 to \$91, or 94 per cent; that select cypress on the New York market has risen from \$30.50 to \$42.40, or 39 per cent; that hemlock, Pennsylvania stock, at New York, has risen from \$11.40 to \$22.25, or 95 per cent, and that according to your price lists, "A" flat-grain yellow pine flooring was quoted at \$16.50 in 1894, delivered on a 22-cent rate, and at \$29.50 in December, 1905, delivered on a 23-cent rate, or a raise of 77 per cent. Of course, I understand that there are a number of factors entering into the case, and am not overlooking the influence of the general rise in the price level during the past few years, the abundant crops,

and the great building activity, but it requires more than these things to explain why it was that your Committee on Values issued six price lists in the effort to keep up with the market last year, and that there is little sagging in the latest list during this winter. It is entirely possible and even likely that there will be temporary halts and even depressions in prices of lumber, but there is every reason to believe that the upward course shown by the price-curves for the last dozen years is but the beginning of a general advance which will continue until an equilibrium between the demand for wood and the amount available for the yearly cut is reached on a far higher price level than at present.

A HISTORY OF THE LUMBER INDUSTRY IN AMERICA

The first volume just published is an exceedingly valuable work for which all interested in the wise use of our forests owe the author a debt of thanks

BY

TREADWELL CLEVELAND, JR.

U. S. Forest Service.

THE publication of Mr. J. E. DeFebaugh's "History of the Lumber Industry in America" is an important event in the world of forest interests. This is the first book in its field, written and compiled in a large, scholarly way by one of the few authorities eminently fitted for the task. And the task has been an unusually difficult one. The sources on which it is based are scattered. Only indefatigable pains and a persistent devotion to his subject could have enabled the author to accomplish it even indifferently. He has accomplished it so well that, even were his long activity as editor of *The American Lumberman* to be forgotten this volume would unquestionably give his name a permanent place in

the history of one of our largest industries. Though necessarily in large part a compilation, the history is in a true sense an original work, the well-planned product of a practical and philosophic mind.

Perhaps the first point which favorably impresses the reader is the historian's point of view. This proceeds from a firm grasp of the relation of economics to history and of the part which the forest has played in the economic progress of the world in general and of the New World in particular. What this means is well brought out in the thoughtful preface. After emphasizing the suggestive fact that "industry and commerce have received in the past but incidental recognition

from the historian," Mr. Defebaugh writes: "Despite this neglect, commerce has always been a controlling factor in making the world's history. It has always been more important that men should live than that they should live under any particular government or at any particular place."

* * * "Out of this new appreciation have come histories of particular industrial movements and of numerous branches of industry; but notwithstanding the influence of the forests on the New World development and the importance of the present lumber industry of the United States, Canada, and the Latin countries to the south, no comprehensive history of the lumber industry of America ever has been compiled."

Chapter I, devoted to the discovery and settlement of the country, emphasizes the dependence of civilized pioneers upon forest resources. "Civilized man lives in houses, and as the house that does not contain wood in some form is practically unknown, the lumber industry accompanies civilized man in all his migrations and progress." * * * "A treeless world might not be uninhabitable, but it is an historical fact that migration, racial progress and growth of population have been guided by the forest distribution of the world—modified, of course, by other considerations, but having that as one of their chief controlling influences." * * * "Whatever the cradle of the Aryan peoples may have been, their migrations led them by forest routes to forest countries."

Chapter II deals with the forest geography of the North American continent. It includes a consideration of the conditions which govern the growth and distribution of tree species, with the influence of past conditions as shown by geology and known climatic changes, and a list of the commercial tree species of America. Mr. George B. Sudworth, of the Forest Service, is the authority which the author follows, with due acknowledgment, and in giving the names and dis-

tribution of tree species Mr. Sudworth's "Check List of the Forest Trees of the United States" (Bulletin No. 17 of the Division of Forestry) is reprinted in substance.

Beginning now with Labrador and Newfoundland, Mr. Defebaugh, in the next succeeding chapters, describes the forests and forest history of this region, of Canada as a whole, and of Quebec, Ontario, New Brunswick, Nova Scotia, and the District of Ungava. In each case the value of the



MR. J. E. DEFEBAGH

Author of History of "Lumber Industry of America," Editor of the *American Lumberman*, and one of the most practical and efficient exponents of American forestry.

forest products is shown in historical tables; such legal provisions as exist to regulate forest use and to secure forest protection are sufficiently outlined; and the development of the lumber industry is traced. Naturally enough, the American reader turns, however, with some patriotic impatience to page 272, at which the author takes up the forest resources of the United States. This opens Chapter XXVI, in the first few paragraphs of which Mr. Defebaugh has ex-

pressed a judgment to which the trained forester will give enthusiastic assent. It is a good thing, indeed, that sentences so significant should have been written by a lumberman whose opinion carries weight and that they should have been given permanence in our forest literature:

"The beginning of the Twentieth Century marked, with approximate accuracy, an epochal period in the timber and lumber history of the United States of America. Until that time the country, in its use of forest products, had been drawing upon a surplus, but thereafter a continuance of production on the former scale, without care for the perpetuation or reproduction of the forests, necessarily would draw upon the capital fund, so to speak, with the inevitable result of a growing scarcity of forest products, or, to be more exact, of an increasing and manifest deficiency in the supply of standing timber from which the product must be secured." * * * The forests were formerly, "especially during the period of development up to about 1850, in many instances a positive detriment. Forests stood on millions of acres of fertile lands which were needed by the settler and the would-be farmer, and a slow-growing crop of timber was occupying land that might more profitably be devoted to the production of grain or other products of agriculture." * * * "But the best informed students of the subject believe, after as careful investigation as they have been able to make, that the forest yet remaining, if operated along conservative lines, would annually pro-

duce in perpetuity an amount of forest products little, if any, more than the present annual output. If that be true, the United States has come to the point where it can no longer be lavish in its use of its wonderful timber resources, but must rigorously conserve them. It will no longer be consuming a surplus, but, except for the adoption of forestry methods, will be drawing upon its capital."

That this judgment is safely on the conservative side may be seen by recalling Dr. B. E. Fernow's figures, in his capital book "The Economics of Forestry." According to these, even with the per acre annual growth of the average German government forest—50 cubic feet—our 25,000 million feet of consumption would take all we could grow on our estimated total productive forest area of 500 million acres. As it is, Dr. Fernow will not allow that our untended forests are growing more than one-tenth as fast as this; so that consumption is gaining on present supplies at a rate which would, if continued, drain them to the dregs in from 40 to 50 years.

The closing pages of the "History" are made up of most useful statistical tables giving the course of timber production and the use of forest products, as well as a review of tariff legislation affecting the lumber industry.

Mr. Defebaugh and his publishers are to be congratulated on this uniquely serviceable volume. It is to be hoped that the remaining volumes may follow without too great delay, and that they may not fall short of the expectations encouraged by this one.



ENDORSEMENT OF MINNESOTA RESERVE

Memorial by the Commercial Clubs of Minneapolis and St. Paul calling for the preservation of this important Reserve

IN the year 1889, there was passed by Congress an act, known as the Nelson Law, in fulfillment of the treaty with the Chippewa Indians of Minnesota, by which they ceded their land and timber to the United States. The operation of this law was attended with so much unnecessary expense that in 1899 the Indians were actually indebted to the government.

A sale of timber on the reservations at Cass and Leech Lakes had been advertised for May 15, 1899; but dissatisfaction with the law, public agitation for the creation of a National Park, and unwillingness of lumbermen—due at that time to a tight money market—to bid upon the timber, caused the state legislature upon February 20, 1899, to petition the Secretary of the Interior to postpone the sale, which was done on March 1, of the same year.

A three-years struggle then ensued to determine what the character of the new legislation should be. The National Park advocates wished the whole area set aside for public use, while the lumbermen contended with reason that this was impossible, and urged instead the carrying out of the treaty stipulations with the Indians, by the sale of the pine.

Meanwhile large quantities of timber were being cut under a clause of the Nelson Law inserted in 1897, whereby the Indian agent was allowed to sell dead or down timber, to prevent its being wasted. Thousands of feet of green pine were cut in defiance of the spirit of the law; and in the winter of 1900 further operations began in spite of the written protest of the State Federation of Women's

Clubs and other organizations, which resulted in a scandal and caused the Secretary of the Interior to discontinue this feature of the law.

In the fall of 1901 Representative Page Morris, of Duluth, introduced in Congress the first draft of what has ever since been known as the Morris Bill, providing for the sale of pine and the settlement of the lands. The public clamor which this aroused was so strong that Mr. Morris decided to modify his bill and to arrange a compromise, upon which the Minnesota Congressional delegation could unite. At a conference at which Mr. Gifford Pinchot, Chief of the Forestry Bureau at Washington, was present a new draft of the Morris Bill was formulated, to which the entire Minnesota Congressional Delegation, of both Houses of Congress, agreed. Delegates from the town of Cass Lake were also present and agreed to stand by the compromise bill, as formulated at this conference; and that bill was passed, chiefly through the efforts of Senator Clapp, and became and has ever since been known as the Morris Law.

In all respects this bill was a remarkable measure. Under it the timber, instead of first being estimated and then sold on the stump, is scaled and sold on basis of the actual quantity cut. The increase in scale over the old estimates averages more than 25 per cent; the minimum price, receivable for the pine, was raised \$1 per thousand, being fixed at \$4 for Norway pine and \$5 for White pine, as against \$3 and \$4 respectively. Again, the bill provides for the timber to be sold under sealed bids, instead of by

made from 1873 to 1876 show that one-half of the upland within these reservations is third-class, sandy and of little or no value for farming. It was the intention of the Morris Bill to embrace within the reservation as large a percentage of these sandy lands as possible, leaving outside thereof all lands of agricultural value; and this policy has been pursued.

While there is some land within the present reserve which might possibly make good farm land, the larger portion has a deep, loose, sandy soil which many years' experience in older farming communities has shown to lack lasting productiveness. The stored-up fertility, which is released when these lands are cleared of timber makes a quick and fertile soil for three or four years; but rains soon wash this plant food deep into the sub-soils; artificial fertilization becomes necessary, but the effect of the application of manures does not last; clover will grow well at first but will not suffice to maintain the productiveness of such deep sandy soil. This worn-out condition does not, however, become apparent to the settlers, who locate upon such lands, until they have exhausted the original capital which they brought with them.

Neither is it generally understood that existing general statutes provide that lands within forest reserves, which are suited to agriculture can be eliminated therefrom; therefore, if there has been included within this reserve land which should be used for farming, it will not be necessary either to amend the Morris Bill or pass any new legislation to eliminate it; but the fitness of such land will be determined by specialists, whose judgment it is believed will be unbiased. Speculators and town-site men, whose only interest often seems to be only to bring in settlers regardless of their future welfare, will not be allowed to influence the selection and elimination of such land from the reserve.

VALUE OF THE SEEDLING PINES.

The value of this small nucleus of a future pine forest becomes apparent, when we consider that before these pine seedlings reach an age at which it will be profitable to cut them for lumber, the entire timber resources of the United States will, according to the best authorities, be completely exhausted. Substitutes for timber, no matter how numerous and effective, have so far failed to lessen the ever-increasing consumption of wood, made necessary by our advancing civilization.

At the American Forest Congress in Washington in 1905, President Roosevelt stated that if the American people did not now provide for a future timber supply, there would ensue, before trees could be grown to large enough size to meet the demand, a period of great hardship and deprivation.

WHAT SHALL MINNESOTA DO?

Shall the State of Minnesota and the nation at large stand aside and allow a small group of speculators, in pursuance of a more than questionable policy, to hinder and perhaps prevent forever the best and possibly the only practical effort now being made in the Mississippi Valley to provide for this future timber supply? The government maintains, upon the head waters of the Mississippi, a costly system of reservoirs to regulate the flow of that stream and to deepen its channel. Last summer, the same selfish interests which are now attacking our forest reserve attempted to bring about the abandonment and destruction of the reservoir system, but failed. The forest reserve supplements the work of the reservoirs; and the same interests, which then so emphatically declared for their maintenance, should now as cordially support the reserve.

MINNESOTA NATIONAL PARK.

Perhaps the most important feature to the people of the Mississippi Valley, as well as to the public of the whole

nation, is the preservation of the park lands upon the shores and islands of Cass and Leech Lakes. Thirty miles of shore line, covered with dense stands of Norway and White pine, embracing scenes of unparalleled beauty, are the heritage to the public bequeathed by the advocates of the old Minnesota National Park idea. The commercial value of this smaller park for the towns of Walker and Cass Lake is as great as is its esthetical value to the public at large. This feature will prove a source of perpetual prosperity and the tourist and other business derived from the mere existence of this park will increase more and more rapidly, as the fame of its beauty and healthfulness spreads. It would be the utmost folly for the people of these towns to exchange their park for the doubtful and evanescent privilege of having settlers take up these sandy lands.

ATTEMPTED REPEAL OF THE MORRIS BILL.

At the last session of the Minnesota legislature a resolution was passed, without debate or reference to a committee, asking Congress that the Morris Bill be repealed. It is believed that many of the legislators themselves did not realize what the effect might be of the motion for which they voted. The resolution was undoubtedly designed to make it appear that the people of Minnesota were opposed to the Morris Bill and were in favor of its repeal.

THE COMMERCIAL CLUBS' APPEAL.

The Commercial clubs of Minneapolis and St. Paul join in an emphatic denial of the existence of such a sentiment.

In the above memorial they have truthfully set forth the history of our national legislation upon this important subject, the reason for its enactment and the beneficent results which have already flowed from it and which we believe have in reality only begun to appear.

They have given to the whole matter the most careful and intelligent consideration possible; they were in favor of the original passage of the Morris Bill and have just declared themselves as not only opposed to its repeal but also to any modification or amendment of it, except such as may be asked for by the United States government authorities in charge of our forest reserves.

We, the undersigned of this memorial, do most urgently request the co-operation of all commercial organizations and all thoughtful citizens, not only in the Mississippi Valley, but throughout the country, to arouse public interest and voice this important matter to the authorities at Washington, for we believe that the people of the nation at large as well as the inhabitants of those states whose commerce this great river fosters and whose acres it waters and fertilizes, are interested in the preservation and protection of every acre of the magnificent forest reserves, which are situated at and tend to preserve and protect its source.

ST. PAUL COMMERCIAL CLUB,

L. G. HOFFMAN, *Pres.*

C. P. STINE, *Secretary.*

MINNEAPOLIS COMMERCIAL CLUB,

F. R. SALISBURY, *Pres.*

W. G. NYE, *Sec. Public Affairs Com.*



MINNESOTA NATIONAL FOREST RESERVE

BY

Rev. J. T. BRABNER SMITH

Frazee, Minn.

PRESIDENT ROOSEVELT acted wisely in securing the services of a disinterested expert in practical lumbering to visit the Minnesota National Forest Reserve, at Cass Lake, and to report the result of his investigations to him at Washington. This report has been made public, and the friends

ends of a few persons, or even to satisfy the real want of a small minority.

For two years I lived at Cass Lake village, adjacent to this reserve, and was there when the first selection of land for this reserve was made. Most of the land and the lakes included therein the writer has personally seen.



Lake Thirteen in the "Ten Sections"—Minnesota National Forest Reserve.

and lovers of the natural beauties of the forest are encouraged.

The knowledge that the Federal Forest Reserves are to be used for the national good will steadily gain them friends, and the idea is constantly growing that such marvellous beauty as exists in the Minnesota Reserve should not be destroyed for the selfish

Eugene S. Bruce, now Expert Lumberman of the U. S. Forest Service, was in charge of the selection of lands to constitute this reserve, and a more able and conscientious man I have never met. He was for years engaged in lumbering work in the state of New York. He is a competent lumberman, and no better man could have been in

charge. His assistants were men of experience. Gifford Pinchot, Chief Forester of the Department of Agriculture, also personally examined the lands. He is probably the most capable forest expert in America, if not in the world, and a man of rare power of discernment. He had no personal preference where the reserve should be located, but simply acted for the good of the whole nation. Mr. Pinchot, Forester, and Governor Rich-

desiring only to do their full duty in making a wise selection.

Settlement of the land by farmers was considered by some interested people better than a reserve; the cutting and denuding of the vast forests of pine, better than keeping them gradually thinned out by scientific logging; the quick and present financial gain more to be desired than a steady and permanent growth and wealth; but at a meeting of the most prominent busi-



Good reproduction of young pine east of Cass Lake.

ards, Commissioner of the General Land Office, went over these lands together with Mr. Bruce, and were agreed on the present location. Other experts also were in accord, and now comes President Roosevelt's special representative, Mr. J. B. White, who indorses all that has been done and reports it as the very best possible selection.

In conversing with Mr. Pinchot, Mr. Bruce, and Governor Richards, the writer found them all unbiased and

ness men of Cass Lake village, held at the time of this visit, both Mr. Pinchot and Governor Richards explained that eventually Cass Lake would be better financially and every other way because of the reserve.

Expert examination showed that the bulk of the land was sandy and best adapted for forestry. Herman H. Chapman, late superintendent of the experimental farm at Grand Rapids, Minn., said, after a careful examination of the lands selected: "The Mor-

ris Bill has set aside 225,000 acres of land for a forest reserve. The question raised as to the advisability of such action hinges largely on a single point—is the land agricultural or not?

* * * Almost the entire area chosen, which lies east and south of Cass Lake, is solid Norway and Jack pine land * * * Farmers on Jack pine sands, except a few truck gardeners, are of no benefit to a community in the end. Land which is not fit for farming can still grow trees."

from sale and settlement. Of this selection Mr. Bruce, shortly after it was made, said, in an address before the American Forestry Association, at Minneapolis: "Regarding the location of this reserve, there are many reasons why that portion of the Chipewewa Indian Reservation, situated in the northerly and westerly part, which includes within its boundaries some of the principal lakes and a long stretch of the Mississippi River, is most desirable as a location for the Minnesota



Good reproduction of young pine east of Cass Lake. *

On the 10th of June, 1903, the first selection of land was approved by the Department of the Interior. This included 104,459 acres, of which 89,707 acres were classed as pine land, and 14,753 acres were classed as agricultural land; this constituted the first selection of the 225,000 acres of land to be selected by the Forester under the terms of the Morris Bill, and there were also selected 6,399 acres to be included in the ten sections reserved

National Forest Reserve. One very important one is that this particular locality contains the largest compact acreage of classified pine land of any section within the reservation * * * This fact necessarily had a strong bearing on the selection, since one of the provisions of the Morris Act is that the selection shall be made from lands *classified* as pine lands * * * There is less true agricultural land in the territory selected than in any other

area of equal size which could have other suitable locality which could be selected. Most of the land in have been selected."

this selection, classified as agricultural, The agricultural, or so-called agricultural land, is far less in area than subject to overflow by the government the pine land, and the pine land is reservoirs * * * Much of this so-called chiefly sandy. Here and there are agricultural land will eventually be de-some rare spots of black loam soil, but ducted when the delineation of the the best land has almost invariably lands which will be overflowed by the been taken as allotments for the In-government reservoirs, located on the dians, who have secured land near the outlets of Leech Lake and Lake Win-lakes, stream, and rivers. The Chippe-nibigoshish, is completed * * * Thewa Indian has not been badly used, territory selected includes within its as the allotments will show, for he has



Good reproduction of Norway Pine.

area some of the finest lake and river scenery in these Indian Reservations, and, indeed, some of the finest in the Northwest. It is very accessible from points which can be reached by railroad. Steamboats and launches can be run through the various lakes and rivers in several directions, to the boundaries of the reserve. Another very strong reason why this location is desirable is that the present reproduction of young pine in the locality selected is greater in proportion than in any

a real paradise to dwell in, with as much freedom as his heart desires. The picturesque Indians add much to the natural beauty of the reserve. They are of a wandering disposition and are not settling down to farming yet; the full-blooded Indian still prefers to live as of yore, by fishing and hunting, and in bands.

The whole reserve area is practically surrounded by lakes, streams, and rivers. Lake Thirteen is one of the most lovely lakes in existence. It contains

pure and sparkling water, fed by natural springs. Like most of the lakes in the reserve, it has sandy beaches, excellent for bathing purposes. The Indians travel by canoe and portages from Cass Lake to Lake Thirteen, through a chain of lakes. The lakes are all well stocked with pike, bass, perch, and some with muscalonge.

From Cass Lake one can take a steam launch, canoe, or boat, and travel for days through the different lakes and streams, amid the choicest

scending to the water's edge. From its crest the visitor can see the shining waters of several lakes and streams, and the distant course of the great "Father of Waters." On this island is the Indians' sacred lake, Windigo, which is a veritable lake within a lake, without inlet or outlet, surrounded by masses of veteran White and Norway pine. Pike Bay, whose shores the ten sections entirely protect, is a lake of extraordinary beauty and location, with a navigable outlet to Cass Lake.



Looking Across Moss Lake in the "Ten Sections."

and most exquisite scenery. The sun and moon, shining through the majestic White and Norway pine on the shores, make a most enchanting and vivid panorama.

An additional proof of its choice location is that the islands in Cass Lake were reserved from sale or settlement. Among those in Cass Lake is the famed Cooper or (Star) Island. It cannot be excelled for charm, standing majestically above the surrounding waters, with its numerous points de-

It has a fine sandy beach and bottom and is seldom troubled with storms, being guarded by pine covered hills.

Along the south and west shores of Pike Bay are some very heavy stands of Norway of an excellent quality. Here and there are small quantities of dead and down timber. It is strange that fire has done so little to destroy this valuable stand of pine, but this is probably the result of the care exercised by the Chippewas to protect their favorite hunting grounds.

Wild flowers in the summer months are plentiful, and the odors from the pines fill the air with health-giving breezes. The wonderful tints of the trees and the colors of the flowers appeal to eye and inner sense and give added joy to the lover of nature. The lakes and woods are the dwelling places of numerous wild birds, ducks, partridges, and other species. Game is abundant. Deer, moose, and bear are plentiful. The reserve is certainly

a great and manifold blessing to mankind, and will be eagerly sought by tourists, naturalists, sportsmen, and lovers of God's out-of-doors.

Let not man, by his greed, spoil that which God made so beautiful, so pure, and so lovely. The future will show the great wisdom of the choice of this reserve and, should it be maintained, people in years to come will rise up and call the Minnesota National Forest Reserve blessed.

FORESTED WATERSHEDS

A New Phase of New England Thrift

BY

ALFRED AKERMAN

State Forester of Massachusetts.

WITHIN a few years several New England communities have become aware that they have been allowing one of their resources to go undeveloped. Among these are Hartford, Middletown, New Haven, and Ansonia, Connecticut, and the Metropolitan District in Massachusetts.

HARTFORD.

About fifty years ago Hartford began to acquire land contiguous to its water reservoir. This land was acquired to protect the water supply from pollution. From time to time, as the needs of the city grew, other ponds with surrounding lands were purchased. In 1902 the total area of watershed owned by the city amounted to 2,500 acres, of which some 1,300 acres were not covered by water. With the exception of a few cords of firewood, this land produced nothing. It was not in a condition to be of service as a park. And it must be held to protect the city's water supply. The question, then, which came before the Water Board was, Is it possible, consistent with its protection functions, to develop the tract as a public park and also

to make it produce revenue?

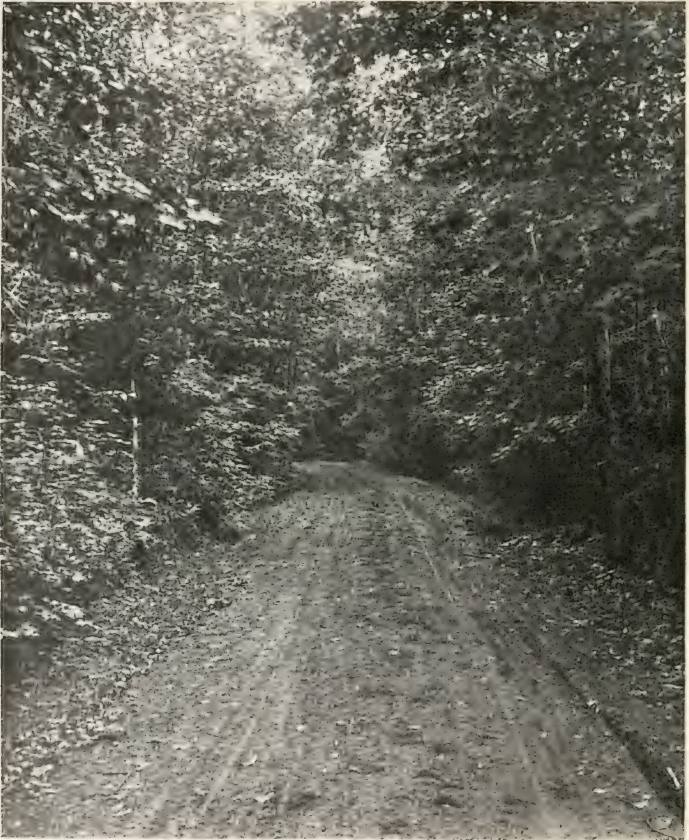
A forest engineer was engaged to examine and report on the tract. His report, or working plan, showed how the tract, if treated in a scientific and systematic way, might in time be made to produce considerable revenue and how at the same time it might be turned into a beautiful, though unpretentious park.

The working plan showed that 1,300 acres were available for forest growing. Of this area 800 acres were already covered with a sprout growth of chestnut, oak, hickory, maple, and other broadleaf trees. The rest consisted of abandoned fields and pastures which were coming up to inferior growths, such as red juniper and poplar leaf birch.

Improvement thinning was advised for most of the forest stands, and planting to timber producing kinds of tree for the old fields and pastures. The thinning was advised for two principal reasons. In many places the stand was so dense that its growth was being retarded. In others, many trees had been damaged by an ice storm which swept over this section of the

country in 1897. From these damaged areas all but the best trees were to be removed, in order to make room for a better growth. From the other portions of the forest only such trees were to be removed as would increase the

been thinned and 73 acres planted. The thinning has yielded a product of 1,263 cords of firewood and 1,338 fence posts. Of this product 369 cords were sold at a net profit, varying from twenty-five cents to a dollar and thirty



A Quiet Woodland Road, Hartford Watershed.

growth and improve the timber quality of those remaining.

The working plan was put into operation at once. In the three years that have elapsed since then, 156 acres have

cents on the cord. The rest of the material has been used for construction and heating purposes; and, although not offered for sale, the same profit has been made on it, for it would have

been necessary to purchase other supplies, if this had not been at hand. As the work was undertaken to improve the growth and increase the future crop, the improvement would have been clear gain, had the product only paid for its removal. The profit that has been realized may be regarded as an extra profit that may be applied to planting the open lands.

The planting has been chiefly to white pine in mixture, with broadleaf trees, such as chestnut, sugar maple, white and red oak, and hickory. All

which has come with experience, and in part to the production of more and more of the stock in the nursery on the tract.

This nursery was established in 1903. It occupies only a third of an acre. It now has a stocking of 125,000 plants, chiefly white pine, white ash, and sugar maple.

It has been found expedient to sow such species as chestnut, oak and hickory directly in the place where they are to grow, rather than to start them in the nursery.



An Improvement Thinning on New Haven Water Company's Land.

but the choicest of the broadleaf trees will come out in the process of thinning, leaving a stand of white pine with a small admixture of hard woods. The mixed planting has been found cheaper than pure planting to pine; and the broadleaf trees are a benefit to the pines; and, moreover, their presence make a choice of species for the final stand possible, should anything happen to the pines. As the work has progressed the cost of planting has been reduced from \$8.00 per acre to \$6.33. This is due in part to the increased efficiency of the workmen

The plantations have been very successful, in all cases insuring a dense stand in the future. Several averages in the 1903 plantings of white pine show that 93.4 per cent. are living.

The young trees planted or sowed in the old fields and pastures have begun to show a little above the weeds and grass; and their growth will be rapid now that they have made a start. For instance, the white pines planted in 1903 and which are now five years from the seed, having been planted as two-year-olds, now average 14.6 inches in height, almost exactly half

of which or 7 inches was made this summer past. For the next twenty years they will average about 18 inches a year.

PARK FEATURES.

The Hartford tract contains nothing grand in the way of scenery. But a turn in the road sometimes brings one upon a scene of exquisite beauty. One of the accompanying illustrations is reproduced from a photograph of one of the reservoirs. On the afternoon of an Indian summer's day in late October, the quiet surface of this tiny lake reflects in charming manner the gorgeous autumnal foliage of the

Maltby Park, the principal watershed of the New Haven Water Company, has been leased to the Yale Forest School for a term of years. It is used as a demonstration forest for the forestry students. Under the direction of their instructors they have mapped the different kinds of growth, estimated the standing wood, and prescribed treatment for the areas that needed treatment. They have not only drawn up the working plan; but they have marked the trees which should be removed, and they have planted a considerable area of the open lands. It



Seedlings of Sugar Maple, White Ash, and White Pine in the Nursery on the Hartford Watershed.

hardwoods and the deep green of the hemlocks on the wooded slope above it.

The people of Hartford are finding out the attractions of the place; and on fair days in spring and fall they come out to drive along the quiet woodland roads, or to ramble over the hills.

NEW HAVEN, ANSONIA, AND MIDDLETOWN.

The writer has dwelt at some length on the Hartford project, because it is typical. The conditions and problems are very much the same in New Haven, Ansonia, and Middletown.

is the policy of the Forest School to make the instruction as practical as possible; and during term-time the students may often be seen at work with axe or mattock. It is a hopeful sign of the times—one that augurs well for the future of our wasted forests—when these bachelors that are, masters that would be, are willing to do manual labor in fair weather and foul in order to train themselves for the battle that is now waged for forest perpetuation in this country.

The working plan for the Ansonia watershed was also prepared by the Yale forestry students.

Middletown is developing its watershed under the direction of the Connecticut State Forester.

THE WACHUSETT RESERVOIR.

The Metropolitan Water and Sewerage Board began to practice forestry on the watershed about the Wachusett reservoir in 1898. There are about 3,000 acres available for forestry pur-

poses. There are some small patches of growth, but the greater part of the tract is made up of old fields. These fields are being planted at the rate of about 200 acres a year.

It will be a quarter of a century or more before the Commonwealth begins to realize in a commercial way on this planting. But it will get its money back with interest; and the



Hardwood Stand, Needing Moderate Thinning, on the Hartford Watershed.

forest on the watershed will be preventing pollution and purifying the water in the meantime. The tract will also serve as a park for the residents of Clinton and neighboring towns.

to consider the reduction of unnecessary expenses, it is also true that the great loss occasioned in a negative way by neglecting to make the most of a resource is in reality just as much an



One of the Reservoirs, Hartford.

A GOOD EXAMPLE.

The cities that have been mentioned are setting a good example of public economy. Some people suppose that economy consists entirely in cutting down expenses. While it is true that most cities and towns would do well

unnecessary expense as though money had been wasted. The New England people are beginning to see this; and in the near future we may find many cities and towns improving their watersheds by the application of the principles of forestry.

REORGANIZATION OF THE PHILIPPINE BUREAU OF FORESTRY

BY

W. J. HUTCHINSON

Forester, Zamboanga, Mindanao, P. I.

THE "Reorganization Act," which provides for the consolidation of the various government bureaus and a reduction of a million dollars in the cost of running the same, was passed by the Philippine Commission, and approved by the governor general of the islands, October 26, 1905.

Under the provisions of this act the Bureau of Forestry will not lose its identity, although several important changes, which take effect December 1, 1905, have been made in its organization. A brief outline of the most important of these changes follows:

1. The chief of the Bureau of Forestry will hereafter be known as the director of forestry.

2. The position of assistant chief is abolished.

3. The Division of Forest Inspection, which has charge of the work of the various forest stations, and whose officials classify, appraise, and order payment on all forest products taken from public lands, is abolished, and its work transferred to the Bureau of Internal Revenue.

As a result of this transfer, the foresters of the different districts will be able to devote their entire time to the silvicultural study of the forests, the location of areas best suited for commercial exploitation of timber and minor forest products, and the inspection of logging operations of various licensees.

The islands are at present divided into ten forest districts with fifty-six forest stations. As all manifests and orders of payment will now be issued by officers of the Bureau of Internal Revenue, it will only be necessary to retain the most important stations as headquarters for the foresters, and a number of the best rangers to assist

in the work of inspection, etc.

4. The Division of Disbursements is abolished, and hereafter all accounts etc., will be rendered to the Division of Disbursements, Bureau of the Treasury.

5. The experiment station located on the Lamao Forest Reserve is to be transferred to the Department of Agriculture, but the bureau will still continue work on the various type-areas in which botanical and silvical studies have been carried on since the establishment of the reserve in 1903.

6. Postal, telephone, and telegraph service on government business will be paid for at the regular rate established for similar services to private persons, out of a fund appropriated for the purpose.

Another item of interest apart from the "Reorganization Act," is the general order issued by the Bureau of Forestry, and approved by the Secretary of the Interior, October 2, which will do much toward alleviating the hard times at present prevailing among the inhabitants of the islands.

This order provides that for a period of five years the residents of the islands will be allowed to utilize free of charge, and without license, forest products, earth and stone, for personal use, cutting of trees of the first group excepted.

Timber cut for sale or export will continue to pay the regular government tax, but the new ruling will do away with the "red tape" heretofore necessary in order to obtain permission to cut a few cubic feet of wood for personal use.

At the present time there are eight American-trained foresters and assistant foresters in the islands, and a number of new men are expected to arrive from the United States early in 1906.

LETTERS URGING THE ESTABLISHMENT OF THE WHITE MOUNTAIN FOREST RESERVE.

UNITED STATES SENATE.

Washington, D. C.

January 13, 1906.

H. M. SUTER, ESQ.,

Secretary American Forestry Association, Washington, D. C.

My dear Sir:—

It is a matter of much regret to me that I find myself unable to respond to your kind invitation to attend the meeting of the American Forestry Association on the 17th inst., and to make a brief address in behalf of the proposed White Mountain Forest Reserve. The press of public duties is such that I find myself just now unable to give much attention to matters outside of my legislative work. The reasons for an appropriation of public funds designed to save the forests of the White Mountain region from devastation are so clearly and forcibly set forth in a report from the Senate Committee on Forest Reservations and the Preservation of Game made during the Fifty-eighth Congress that it is impossible to add anything to the presentation there made. The White Mountains of New Hampshire are in the broad sense the property of the people of the entire country, and I am gratified to know that the destruction of those forests is being protested against by leading citizens of many of the states of the Union. While New Hampshire will sustain a loss if the forests of the White Mountain region are destroyed, it is equally true that a positive loss will accrue to the American people as a whole. The objection that has been made in certain quarters that it is a new departure to appropriate public money for the purchase of land for a forest reserve, while technically true, loses its force in view of the fact that millions of acres of the public domain

have been set aside for forest reserves, thus indirectly taking from the Treasury the proceeds from the sale of such lands. In one case the money was halted before it reached the Treasury, and in the other it is proposed to take it from the Treasury after it has been paid in, which, after all, is but a difference in methods. I hope that the requisite appropriations may be made in the near future for the acquisition of lands necessary to establish both the White Mountain and Appalachian forest reserves, as is proposed by bills now before Congress.

Very respectfully yours,

J. H. GALLINGER,

U. S. S.

From Hon. T. Jefferson Coolidge.

BOSTON, MASS.

HON. F. W. ROLLINS.

Dear Sir:—I have read with great interest the bill of Senator Gallinger, of New Hampshire, proposing that Congress should make a forest reservation of one half a million or more of acres in the region of the White Mountains.

It is unnecessary for me to say to you that for some years the manufacturing establishments on the Merrimac River in New Hampshire have suffered seriously from the cutting down of the forests. One freshet, a few years ago, cost the Amoskeag Company more than one hundred thousand dollars.

Besides the injury done by the excessive flow of water in freshets, we suffer also in the same way from absence of water during dry seasons, as the woods no longer retain the water. It is emptied at once, and not held back to trickle slowly into the streams.

But New Hampshire is not the only state to which this reservation would

be of inestimable value. The Connecticut, the Merrimac, and the Saco, all have their sources in the White Mountains; so that Vermont, Connecticut, and Massachusetts are equally interested in the scheme, and even the Androscoggin derives part of its stream from the country north of the White Mountains. Maine, therefore, will also be benefited.

All the states in Europe have realized that it is absolutely necessary to preserve the forests, in order to prevent freshets at one season and droughts at another, and I think almost all of the governments have adopted forestry laws which forbid the cutting of wood unless with permission of the government.

I trust, therefore, that the senators and representatives will unite in the heartiest approval of Senator Gallinger's proposition.

T. JEFFERSON COOLIDGE.

From Hon. Richard Olney.

HON. FRANK W. ROLLINS.

My dear Governor:—I trust Senate bill, Fifty-eighth Congress, No. 2327, introduced by Senator Gallinger, of New Hampshire, may become a law.

That it is in the public interest and seeks to promote objects of great public importance cannot be doubted.

The only question is whether these public objects may be properly considered as national in character—as being purposes for which the national revenues may be legitimately appropriated. On this point it is to be remembered that the mountain regions of New Hampshire are the sources of three important rivers—the Connecticut, the Merrimac, and the Saco—and that the Androscoggin traverses a part of the state and is indebted to it for two important branches; that these rivers flow into other states and furnish water and power to municipalities and large manufacturing industries, whose welfare and prosperity are greatly dependent upon the regularity and evenness of the supply; that the increase of the timber supply of the

country is as important as the increase of any other product of the soil; and that in addition to the large commercial and industrial interests involved, thousands of people from all parts of the land annually visit the hill country of New Hampshire for rest and recreation. In view of these considerations, it cannot be fairly claimed that the subject matter of Senator Gallinger's bill is of interest to, and should be dealt with by New Hampshire alone.

RICHARD OLNEY.

From Morris K. Jessup, Esq.

NEW YORK CITY.

HON. F. W. ROLLINS.

Dear Sir:—I am in receipt of yours of the twenty-second relative to a national forest reserve in the White Mountains. I am in hearty accord with this movement, and have always advocated the cause of the preservation of our forests, which are so essential to our water supply for the large cities, as well as the manufacturing industries. * * * * *

You have my earnest wishes for the success of your undertaking, and I trust Congress will see fit to carry out the proposed bill which has been introduced in the Senate.

MORRIS K. JESSUP.

From Rev. Edward Everett Hale, D.D.

WASHINGTON, D. C.

My dear Governor Rollins:—I was appointed at Intervale, New Hampshire, chairman of the committee which should express the sentiments of powers outside New Hampshire regarding the preservation of the New Hampshire forests. And I also write with a good deal of personal feeling. For I was on the Geological Survey in those regions in 1841, and have with these eyes seen forests demolished in which were trees centuries old, and where the region is given over to sumach and blackberry bushes. It is no mere matter of botanical curiosity which we are pleading for. It is the preservation of a water supply which

affects five out of the six New England states. It also affects the very existence of whatever makes the region attractive to persons from every part of the nation. It is easy to see on mere economical grounds that the destruction of forests has been the ruin of many a nation which did not have wisdom enough to keep them. In our case the gradual denudation of our noblest mountains will destroy the noblest and best ground for Re-Creation which is now open to all people east of the Mississippi.

We hope with all our hearts that the great Appalachian reserve will be purchased for the nation. Four thousand square miles is none too large a reservation. Certainly with so satisfactory a standard as that, ten or twelve miles square, say a hundred and sixty square miles, is none too large for another breathing ground for forty million people.

EDWARD E. HALE.

RESOLUTIONS IN FAVOR OF THE RESERVATION.

Resolutions by various commercial and other organizations have disclosed an interest extending beyond the boundaries of New England. A few typical resolutions are here given:

By the American Paper and Pulp Association.

NEW YORK CITY.

Resolved, That the American Paper and Pulp Association approve of Senate Bill No. 2327, for the purchase by the government of a national forest reserve in the White Mountains, to be known as the National White Mountain Reserve, it being a step in the direction of scientific forestry and proper protection of our water supply.

By the Boston Associated Board of Trade.

BOSTON, MASS.

Whereas, the continued unscientific destruction of our forests in New Eng-

land is affecting our rivers and indirectly our manufacturing resources, also denuding and permanently destroying the productiveness of large areas of land,

Resolved, That the Associated Board of Trade heartily endorse Senate Bill 2327, for the purchase by the government of a national forest reserve in the White Mountains, to be known as the National White Mountain Reserve, and that our senators and representatives in Congress be requested to assist in the passage of the bill.

By the New Haven and Coastwise Lumber Dealers' Association.

NEW HAVEN, CONN.

Whereas, the New Haven Lumber Dealers' Association views with much concern the rapid cutting down of the forests of the great White Mountain region, a situation which threatens within a comparatively short time to sweep the central portion of these mountains entirely clean of the splendid trees which "formerly made it one of the few great forests standing east of the Alleghanies;" and

Whereas, we learn a bill has been introduced in the United States Senate which has for its object the saving of the remainder of these forests by an appropriation which shall create a national forest reserve in the White Mountains,

Resolved, That as an association of lumbermen conversant with the needs and the urgency of the situation, we thoroughly endorse the purpose of this bill and hope that this present session of Congress will take speedy and favorable action in the matter.

Resolved, That copies of these resolutions be sent to our senators, the Hon. Joseph R. Hawley and the Hon. Orville H. Platte, and to our representative, the Hon. Nehemiah D. Sperry, urging them to give their hearty and earnest support to this bill.

By the National Wholesale Lumber Dealers' Association.

WASHINGTON, D. C.

The report of the committee on forestry, which was adopted, contained the following:

"There is at present legislation projected, and in some cases far advanced, asking for state and federal aid in the establishment of forest reserves, which should receive the aid and support of the members of this association. Among these are the projected Appalachian reserve and the National White Mountain forest reserve; for the latter Senate Bill No. 2327 is now pending in Congress, and your committee asks that this association shall say that

"It is the sense of this annual meeting that the members shall in every

way possible lend their support, aid and influence to the passage of this bill and all legislation of like kind."

Resolutions have been passed also by the following associations: Boston Lumber Trade Club, Boston Merchants' Association, Connecticut State Lumber Dealers' Association, Rhode Island State Lumber Dealers' Association, New Hampshire State Lumbermen's Association, Appalachian Mountain Club, and National Forestry Association.

The society has asked men and women of New Hampshire birth and ancestry who are living in other states to write to their respective congressmen requesting favorable action.

The outlook for the bill in Congress is favorable.

SUGGESTIONS FOR STATE FOREST FIRE LAWS

BY

E. J. CHEYNEY

Minnesota Experiment Station.

THE forest laws of most of our states are far more impressive in the reading than they are effective in the application. There are at least three glaring weaknesses—almost universal in their occurrence—the correction of which would make all the other shortcomings of the laws seem trivial indeed.

In the first place, the legislatures—led by what is probably a false idea of economy—would all seem to have the bee by the wrong end. The laws are nearly all directed toward the fighting of fires which have already started in the woods, providing dire punishments to be visited on the heads of those who are supposed to have set such fires, and giving promise of horrible things which will be done to any district attorneys who do not properly

prosecute such offenders. To this end a grudging and usually inefficient appropriation is made for fighting fires. Many of the laws simply appoint fire wardens, without pay, empowering (?) them to fight fires and hire help for that purpose, without making any appropriation whatsoever.

These laws are a good thing. Not only does it show that people are waking up to the necessity of such things, but they are of practical value in providing men where they are very badly needed. It would, however, be much better to look to the prevention of fires so that there would be no necessity of fighting them. The old adage that an ounce of prevention is worth a pound of cure applies nowhere better than to forest fires. And would it not be possible to bring this about with

little or no increased expense to the state?

Under the present system a fire warden is paid only for the time spent in actually fighting the fire. He cannot afford to neglect his own work to look for fires in the places where they are most likely to occur, nor even to waste an afternoon in hurrying to inspect a rumor which may turn out to be a false alarm, and consequently no pay. In this way a fire almost necessarily grows to dangerous proportions before anyone can afford to take any notice of it, and a large number of men are then required to fight it.

Every forest fire has a small beginning and a very large per cent of these beginnings would be found by a man who was paid to look for them; and would be found in such time that he could put them out alone with the aid of one or two helpers. Without looking into the value of the property which would be saved in this way, it is an open question whether a paid regular patrol would not nip in the bud a sufficient number of fires to make that plan actually cheaper than paying the crowds of temporary laborers who have to be called in at extra high wages to fight the fires after they have gotten well under way. For example: It would not require a very large fire to force a warden to hire thirty men for two days at \$2 per day. One hundred and twenty dollars is spent in putting out this one little fire which has nevertheless done considerable damage before it was gotten under control. That \$120 would pay one man to patrol a large territory for three months of the summer danger season—April, May, and June. Such a patrol would probably have caught this fire—together with dozens of others—in the incipient stage, saved several thousands of feet of lumber, and the expense of several hundred fire fighters.

That millions of feet of timber would be saved in this way is beyond question, but would it not also be cheaper in the actual cash outlay?

APPOINTMENT OF WARDENS.

Another mistake, though not nearly so important as the first, is the appointment of elected men, such as the Selectmen of a town, to the position of fire warden. A man will not leave his own work to go fight a fire on some one else's ground and probably for some one else's benefit, unless he has to, and forcing men to do such things is not a business calculated to make a man popular. Consequently the elected fire warden is not going to do it, or can he be greatly blamed for refusing. He does not care about losing the position as fire warden, but the more paying or more honorary position by virtue of which he is fire warden. One or two of the states have realized this and found a very good solution of it in the appointment of the wardens by the courts.

THE MATTER OF PAY.

This difficulty which the fire warden has in obtaining aid in time of fire—a question which seems to puzzle some people unduly—is the result of another great weakness in the fire laws. They usually offer higher pay than is given for other work, but men do not volunteer for their work. The causes are not far to seek. The job is a peremptory and temporary one—which does not matter so much, though both these characteristics go against the grain of the average American—and the pay comes somewhere in the far future—which matters a great deal. To the class of men hired on such occasions pay in the future is no pay at all; they would rather work for fifty cents and get it at once, than for two dollars to come a month hence. And lucky is the man who gets his money through the government red tape in a month! The Pocono Protective Fire Association, in Pennsylvania, though they do not pay as high wages as the state, have no trouble in getting men for this work because they pay cash. This has been pretty generally acknowledged as a

great fault, but nothing has been done to remedy it.

I would like to suggest the following plan: The length of time taken to get the money from the state treasuries is largely the result of the cumbersome working of those institutions and therefore unavoidable. But why not have a sub-pay station in the shape of the small country stores? Arrangements could easily be made with such stores, without expense, to credit the order of the fire wardens. These orders could be made out on the grounds immediately after the work was completed, taken to the neighboring store, and there either be exchanged for cash or credited on the books. The stores

would be willing enough to do this for the increased trade which it would inevitably bring them, and could wait for the slower pay of the government. Probably many orders are now cashed at the stores at a tremendous discount; an agreement between the store and the state would secure full pay for the holder. To make this system secure against leakage the wardens should be paid and bonded men, but the small amounts of money involved and the caution of the stores would act as a pretty good check on any fraud.

This would seem to be the most effective way of bracing up a weak system which is the next best thing to getting a new one.

ANNUAL REPORT, GOVERNMENT EMPLOYEES MUTUAL RELIEF ASSOCIATION

THE Government Employees' Mutual Relief Association is intended to include male employees of the Geological Survey, the Reclamation Service, the Forest Service and other like government offices. It is organized to meet the unexpected expenses of its members resulting from accident, illness, or death. It is also intended to relieve their associates in services from the burden of caring for them, which in the past has sometimes been excessive.

The government does not assist civil employees who die, become sick, or injured, whether in the course of duty or otherwise.

This organization is intended to meet the conditions arising from this fact in a way that shall enable each employee to care for himself and not, as in some cases in the past, be dependent upon the voluntary assistance of his associates.

The policy issued provides:

1. Indemnity for loss of time on account of accident or illness to the extent of \$150 in any 12 months.

2. Repayment of doctors' bills, hospital expenses, and medicines to the extent of \$100 in any 12 months.

3. In case of death, actual expense of preparation of body and its transportation home, also \$100 additional for funeral expenses; total not to exceed \$600; or in case of death at home, a cash payment of \$200 for funeral expenses.

The dues are \$12 per year, payable semi-annually or in some cases monthly. A membership fee of \$1 is payable upon joining the Association, and goes into a reserve fund, available for benefits only.

In the few months of its existence, the Association has relieved several cases that would have left the member or his family in a distressing condition, besides requiring others in his party to aid in caring for him during several weeks.

One member, who had been insured only four days, was thrown by a horse thus sustaining a serious double fracture of the leg. He received the maximum payment, \$100, for medical

attendance and also \$53.57 indemnity for loss of pay, which was particularly opportune as he was for several weeks without pay.

An employee of the Forest Service postponed joining the Association until his return from a field trip during which he was drowned. His unexpected death, with the attendant expenses which were met with great difficulty, imposed a heavy burden upon his family. This would have been avoided if he had carried out his intention of joining this Association.

A number of other cases have arisen since the organization, in which the distress to an eligible employee, who had not joined, or to his family, due to the expense of death, illness or accident, has been seriously aggravated by the need of funds for meeting such an emergency.

In many such instances associates have been compelled to help out with these expenses from their private resources and such demands have at times been very heavy.

It is the aim of the Association to give every eligible employee an opportunity to protect himself, his relatives, and his associates from such calls and to relieve his associates from moral responsibility to aid, which cannot be so binding when the injured man has failed to take advantage of the opportunities offered.

One feature to be emphasized is that the relief is immediate. Payments are made as soon as notice of death is received, and there is no delay in meeting the request for indemnity in cases of sickness or accident when supported by ordinary receipts and a simple certificate from the chief of party or other superior officer.

There is no red tape. A member died during the night of December 28. The Secretary was informed at nine o'clock in the morning of the 29, and before noon of that day the death benefit of \$200 was in the hands of the widow.

Every member can aid to make the Association stronger, can protect him-

self and family from money loss due to death, sickness or accident, and protect himself against personal calls for assistance by continuing his membership and by interesting his associates to apply for membership, which will be effective from date of application, if certified by chief of party or other superior officer.

The Association's experience to date proves what was expected at the time of its formation, that, through saving of exorbitant salaries and advertising, and by paying no rent or agent's commissions, it furnishes a fourfold greater protection for the rate of membership dues than any known public accident and health company. The credit dividend on January 1, 1906, was 35 per cent of the amount paid in for membership dues. This will be available as a credit on dues for the latter half of the year 1906.

The Governing Committee announces that on January 6, after the audit of the books of the Secretary and Treasurer, the financial condition of the Association is as follows:

FINANCIAL STATEMENT.

<i>Receipts:</i>		
From dues, 1905.	\$937.00	
From dues, 1906.	6.00	
	<hr/>	\$943.00
From fees.....	177.00	
	<hr/>	\$1,120.00
<i>Disbursements:</i>		
Stationery and printing..	\$76.10	
Postage	21.20	
General expenses.....	20.00	
Salaries	131.23	
Medical indemnity.....	134.50	
Sick indemnity.....	53.57	
Death benefit.....	200.00	
	<hr/>	636.60
Balance in hands of treasurer..		\$483.40

CREDIT DIVIDEND.

Deducting from the balance in the hands of the Treasurer the amount of the reserve fund, \$177, and the amount of dues paid for 1906, \$6, there is left available for the credit dividend provided by Article X of the Constitution, \$300.40.

Of the 177 members who have joined the Association, 28 are sus-

pended for non-payment of dues (monthly members), one member has died, and 3 members have received indemnity, leaving 145 members entitled to share in the credit dividend.

These 145 members have paid \$832 in dues, making the distribution of the \$300.40 on the basis of 35 cents for each dollar of dues paid. This credit dividend, in the case of those whose membership began June 1, 1905, will be \$2.45, as they paid \$7 dues. Those whose membership began July 1, paid \$6 dues, and will be entitled to \$2.10, and so on.

This credit dividend will be available in payment of dues at the end of

1906 by those who remain in good standing.

Those whose credit is \$2.45 will pay \$3.55 on July 1, 1906, to be paid up to the end of the year, or if they pay monthly will be called upon to pay only 55 cents for October and will then be paid up to the end of the year.

This dividend is a little less than the approximate amount announced in the notice of the annual meeting on account of the death of Herbert B. Blair during the last week of the year. The death benefit of \$200, paid to his wife, reduced to that extent the amount available for the dividend.

AIDING CITIES AND TOWNS TO NAME THEIR TREES

The Forest Service will Identify Trees in Streets and Parks

THE increased interest in forests and forest trees which is a sign of the times has, among other things, led many city and town officials to seek to make known the names of trees growing in streets and parks. Not only are such trees in very many cases now without marks of identification, but in not a few cases they have been labeled with incorrect names. The Forest Service has devised plans by which its co-operation may be secured in correctly identifying the public trees of any community which may care to call upon it.

It is remarkable how little uniformity there is in the use of tree names. Even scientific names, which are, of course, always more exact than the common names, are in many cases unsettled, but common names are often used almost at random. In different parts of the country the same species may be popularly known under very different names, and, on the other hand, the same name is often used in

different localities for altogether different trees.

In the effort to assist toward uniformity of usage in scientific names of forest trees, and also to lessen the chaos in the use of common names, the Forest Service has already published "A Check List of the Forest Trees of the United States." This serves as a guide when once a tree has been identified by the botanist. But the first requisite is that the identification should be correct. It is here that difficulty is often met with. For this reason the Forest Service now offers its technical knowledge to city authorities.

There are two ways in which assistance may be given. Where the work is on a large scale, a representative of the Service will visit the town or city and identify the tree by examination on the spot. In most cases, however, identification by correspondence will prove entirely adequate. This will require merely that specimens of the

trees be sent to the Forest Service, together with a rough sample plat showing their location, the plat and specimen being numbered to correspond.

For such identification a full set of specimens, illustrating mature foliage, and, if possible, specimens of the flowers and of the fruit (as the botanist call the seeds) should be sent. Fruit specimens are very essential, but flowers may be omitted if they cannot be readily secured. Two or three specimens of branches in leaf, 10 or 12 inches long, taken from different parts of the crown, so as to exhibit all of the leaf forms common to the species, will answer for the foliage. One or two specimens of the foliage, flowers, and fruit may be placed between sheets of ordinary newspaper or blotting paper about 12 by 16 inches in size. Thirty

to fifty specimens and sheets may thus be piled one on top of another, and the whole bundle placed between two stiff pieces of mill board, pasteboard, or thin picture backing, a little larger than the sheets of paper carrying the specimens. The package must then be well tied and wrapped, when it may be sent by mail if under 4 pounds in weight. If, before sending, the specimens are changed to dry sheets of paper once in twenty-four hours, keeping them constantly under a weight of from 40 to 50 pounds, they can be thoroughly dried within two or three weeks, when they will not be so heavy and will still be in excellent condition for identification.

Suggestions as to labels and their use are also made by the Service when requested.

HUGE CONSUMPTION OF WOODEN FENCE POSTS

In the Middle West, Where Trees are Scarce, It Will Pay to Grow a Supply.

THE difficulty of obtaining fence posts at reasonable prices has given an impetus scarcely realized to forest planting in the Middle West. Newspapers, farmers' institutes, women's clubs, and boards of trade throughout the region are pointing out the need of such material and dwelling on the profit realized by the few men who planted trees years ago and whose plantations have been successful. The local supply of all forest products is insignificant, and timber, if not grown at home, must be imported. With the continuous retreat of the sources of supply under the attack of the vigorous demand, the length of the haul increases and the cost of transportation rises higher and higher. Yet the fields and pastures must be fenced. The posts must be had.

The annual production of fence posts in the regular logging camps of

the country, as reported by the last Census, is 8,715,661. How many times greater than this is the annual cut from the home woodlot no figures exist to show; but by taking the total number of farms and their acreage and making a conservative allowance for posts for the fences inclosing each farm, it has been estimated that upwards of 1,000,000,000 posts are set each year. Such figures are too vast to mean anything. Even the nine million posts of the Census, a mere drop in the bucket as compared with the unreported production, would, if set 15 feet apart, girdle the earth, or would build a solid pile 55 feet wide, 40 feet high, and a mile long.

Durability and at least moderate strength are the desirable qualities for fence posts. The use of species which are not durable is expensive, both on account of the more frequent renewal

which is necessary and because repairing is constantly called for. Timber of the required quality is produced in the Middle West by hardy catalpa, black locust, and Osage orange.

Catalpa makes an excellent growth on deep, porous, fertile soil, but only on such soil. Five or six inch posts should be ready to cut in about ten years. In regions immune from the locust borer black locust will yield satisfactory returns from soil in which catalpa would fail, and for this reason it is adapted to a wide area where the rainfall is light. Under ordinary conditions, locust should produce fence material in fifteen years.

Osage orange also is not exacting in its soil requirements. It is being extensively planted for hedges and wind-breaks, from which a considerable yield of fence posts may be obtained. It makes satisfactory growth on dry

soils and reaches post size in from fifteen to twenty years.

Several other species, such as white willow, European larch, Russian mulberry, and red cedar, are also being grown with good results, but none of them is better fitted to supply fence posts than those first named.

The Forest Service fully recognizes the importance of fence posts in farm economy and the great demand for suitable timber. Studies of the growth and durability of various species have been made, and the limits of the commercial planting range of each has been more closely defined. Rapid-growing species which are not durable have been studied to determine some form of preservation treatment which will increase their durability. Further work along this line will undoubtedly add largely to the list of species which can furnish the desired product.

A NEW SAVING IN THE TURPENTINE INDUSTRY

Further Economy Effectuated in Experiments Made by the Forest Service, which Introduced the Cup and Gutter System.

THE recent experiments of the Forest Service, designed to conserve the life of turpentine trees, gives promise of remarkable success. It is believed that the improvements tested in these experiments will, in addition to prolonging the life of the trees, greatly increase their total yield of turpentine.

When the cup and gutter system of turpentering was introduced by the Forest Service some three years ago, the economy which it secured led to its adoption on a large scale by southern turpentine producers. What lends this system its great value is the fact that it does away with the old practice of "boxing," which consists in cutting a deep cavity or "box" at the base of the tree for the purpose of catching and

holding the resin which flows from the chipped "face" of the tree trunk above. In place of the "box" an earthenware cup, of the same capacity, is fastened to the tree. To this the flowing resin is directed by means of metal gutters. The disuse of the "box" effected a twofold gain—first, a saving of the deep, fatal wound in the base of the tree, and consequently a conservation of its vitality; and second, much less waste in the gathering of the product, with a greater yield of turpentine and better grades of resin.

While this decided improvement spared the tree very considerably, the method of chipping "faces" to stimulate resin flow remained unchanged. This in itself, necessitates a deep wound, which, it is believed, exhausts

the vitality of the tree more than is necessary. Exhaustion is evident from the fact that after the first year the yield quickly falls off, and the total productive period is also limited. A further step in advance, to supplement the gains already secured by the cup and gutter system, was therefore sought in the new plan. This aimed to reduce the size and number of "faces" chipped, and also the depth of the chipping, without diminishing the flow of resin.

In the experiments carried out during the past season the first object was to show that at least an equal flow of resin can be secured from shallower and shorter "faces." The success of these experiments has tentatively established the practicability of this plan. A great saving naturally results, for by reducing the depth and the superficial extent of the wound the drain on the vitality of the tree is reduced, and at least an equal yield is secured without discounting the product of future

years. Under the old system the annual yield gradually falls off, largely in consequence of the formation of "dry-face," which is a kind of local death, affecting the exposed wood of the tree.

It is highly probable that with this diminution in the severity of the operation the ordinary term of three or four years during which a forest is now worked can be greatly increased. This means not only a larger total return, and consequently larger profits, but also that the investment period for turpentine capital is lengthened, a fact which especially appeals to the investor.

The experiments are being conducted in co-operation with the Hillman-Sutherland Land Company, which last year placed four crops of trees, of about 8,000 trees each, at the disposal of the Forest Service, and for the season of 1906 has consented to supply still more timber to further the study.

NUT GROWING AND FORESTRY

BY

LESLIE HARRISON

ONE of the main causes working against the immediate adoption of forestry is the distant future of the returns. American civilization lives too much in the present, and it is hard to persuade the average man to sacrifice himself in the interests of a posterity some generations removed.

But there are certain trees which are now and always will be valuable for their timber, and which also bear paying crops long before they are available for the sawmill. Chief among these are the chestnut, walnut, and hickory. There are a number of other valuable nut trees, but their cultivation has come into the realm of the orchardist, as it notably the case with the so-called "English Walnut" and

almond, in California and the pecan in Texas.

Little has as yet been done in the improvement and cultivation of our native nuts, especially those borne on valuable forest trees. Much attention has been given to the orchard varieties, but when our indigenous nuts have been improved it is probable that they will be even more in demand than some of the more important carefully cultivated nuts of the present day.

The chestnut has received some attention, particularly in Pennsylvania and New Jersey, and it is deserving of considerable more, for its main value lies in the fact that it can be used on rough upland country where the possibility of other crops would be at a

minimum. Moreover, it has been successfully demonstrated that imported and fancy varieties can be grafted onto native hardy stock, to produce fine nuts in great profusion. The different kinds of hickory and walnut need lower lands, but even these trees can be successfully grown in bottom lands whose frequent overflow renders them unfit for farming purposes. While these varieties are growing they are not only producing a valuable timber stand for the future, but in the present they incidentally furnish a valuable by-product in the nuts grown, making such plantations valuable properties long years before they mature for lumber. By this plan annual harvests will pay the expenses of forest operations, and the man who plants these hardwood trees has a reward in addition to the feeling that his children will have a valuable inheritance in the timber.

Mr. E. A. Sterling, of the U. S. Forest Service, in a report furnished to the New York Forest, Fish, and Game Commission, recommends highly the cultivation of chestnut groves, basing his recommendation on actual observations of groves in New Jersey and Pennsylvania. In these two states chestnut culture has been tried in two ways; in groves of actual forest growth under forest conditions, and in orchards under orchard conditions. The former method is a complete success, and in its utilization of waste land takes nothing from areas which otherwise might be profitably devoted to the cultivation of other crops. In the latter method the chances of failure seem to be greater, and in case of a failure there is not only the loss of

the crop itself, but the loss of the use of the ground on which the attempted crop was grown. The most successful method in use was the grafting of Japanese, European, or desirable native varieties on the coppice growth on cut-over chestnut lands, thus insuring, in the second growth a maximum annual crop value in a minimum time.

It has been found that the Paragon is the best variety for grafting, and these will be in bearing in four years, with an annual increase in the value of the harvested crop. There is no trouble in disposing of the yield, as the demand is far in excess of the supply. The best Paragon nuts sell readily at prices averaging 10 per hundred-weight, and a usual price is \$7 per bushel. While the trees do not produce phenomenal yields in their early years, especially if many of the burrs are removed in order to get improved quality and size of nuts in the remaining ones, still the yield of older trees is enormous, single trees giving \$40 worth of chestnuts.

It is probable that the success attained by the Pennsylvania groves will tempt others to make use of worthless old hillsides to produce a crop of nuts as well as timber, and under such conditions the work forms a branch of forestry rather than horticulture, since the essential elements of the forest are all there. More than that, chestnut culture should go a long way in solving the problem of reclaiming worthless burned and waste land, which at the present time is a standing menace to surrounding forests. In addition to this it provides for a more complete utilization of forest areas.



THE CALAVERAS GROVE OF BIG TREES

Reasons for Their Preservation by the Federal Government

BY

MRS. LOVELL WHITE

Chairman, Calaveras Big Tree Committee, Outdoor Art League of California.

THE Calaveras Groves of Big Trees were discovered by Gen. N. P. Chipman, of California, in 1841. The existence of the Big Trees, those giants of the forest, became known over the entire world so soon as the slow methods of transportation then in vogue in California could carry the news of their discovery abroad. When the truth concerning the story of the Big Trees was verified, distinguished scientists from the great centers of learning in Europe visited the newly revealed mammoth groves, as they were sometimes called. The north grove contains 101 big trees and the south grove, some six miles removed, claims 1,380.

About this time a man came from England in the interest of the world's fair to be held in the Crystal Palace in London. He purchased from the owner one of the largest and most beautiful trees in the north grove, called the "Mother of the Forest." He paid ten thousand dollars for the tree and killed her by literally skinning her alive. By the aid of sharp instruments he took the thick bark in sections from her body and thus left the mighty "Mother of the Forest," white and bare and an almost tragic figure, standing in the midst of the green woods. Removing the bark to London, he there erected a cylinder of the sections into the exact shape of the denuded tree. This similitude of a Calaveras big tree was viewed by hundreds of thousands of people and the fame of the California big trees became world-wide.

It is now six years since the grove passed, by purchase, from the hands of

the original owner, who kept a hotel in the north grove, into the possession of another, who evidently was inspired with more practical ideas than were entertained by the tree lover who exploited the groves as mere show places.

When the sale was reported by the newspapers, the women of the California Club, of San Francisco, at once took action toward the end of preserving to future generations a wonderful heritage worthy our name and country. The California congressional delegation was instructed to present a bill to Congress asking the government to purchase the groves.

The Big Tree bill has easily passed the Senate at each of its six years of history in Congress, but it can proceed no further and lodges ignobly in the House of Representatives, where existing difficulties seem insurmountable. Meantime the price of timber holdings has increased so rapidly on the Pacific coast that property has almost doubled in value, and the problem of acquiring the trees becomes more and more complex. The age, size, beauty, and unsurpassed grandeur of these prehistoric giants among trees lend them a worth beyond the mere commercial estimate put upon them by lumbermen. We are told that the *Sequoia Gigantia* are the oldest living things on earth today, and that they can only be found in detached groves on the western slopes of the Sierra Nevada Mountains. They are priceless, and their advent in the world's history antedates that of the patriarchs of the Bible. These matchless treasures

should belong to the nation and be vaunted as its chief pride and glory. Yet with them in peril we sit idly by awaiting the trend of events.

What is to be the fate of the Calaveras groves? What is the wish of the people concerning their destiny? There must be some way to acquire the groves for posterity.

If the one million and a half of people who signed a petition in 1904 sent by the Outdoor Art League of San Francisco to President Roosevelt urging him to request Congress to pass the Big Tree bill had accompanied their names with a dollar each the trees could easily have been purchased, and also the magnificent forest tracts immediately surrounding the groves. But this was not asked, be-

cause the league believed that Congress would pass a bill so generally demanded by the people and indorsed by President Roosevelt, who sent a special message to Congress on receipt of the huge petition, urging it to pass the bill.

In view of the monetary condition of the United States government, and the many demands to be made upon the common Treasury, but little hope can be entertained for favorable legislation for the groves at the present session of Congress. What, then, is the next step to be taken? Will you abandon the big trees to an ignoble fate, or will all patriotic Americans unite in some feasible plan to preserve to the world the greatest living marvels now extant in the universe?

RECENT PUBLICATIONS

Evergreens; How to Grow Them. By C. S. Harrison. Pp. 95, illustrated. Webb Publishing Co., St. Paul, Minn., 1906. Cloth, 50 cents net; paper, 25 cents net.

This little volume is, above all, a practical work. The text is in simple, untechnical language, combining a guide to the selection and growth of the better known conifers, with full and explicit descriptions of various species and their peculiarities. Mr. Harrison is president of the Nebraska Park and Forestry Association, and the deep interest that he feels in forestry is manifested throughout the book, notably the first chapter, where the effects of forest denudation are forcibly and succinctly brought out. Mr. Harrison has had more than thirty years' experience in nursery work and forest planting in Nebraska, and this book is the result of his experience and observations. It should prove especially valuable to the farmers and land owners of the West and Northwest.

plans to further increase its activities. The introductory part of the bulletin is an excellent exposition of the forest situation in Massachusetts, and of the importance of conservative forest management.

The First Country Park System. A History of the Development of the Essex County Park of New Jersey. By Fred W. Kelsey. J. S. Ogilvie Publishing Co., New York. Price, \$1.25.

It is quite true, as the author states in his opening paragraph, that the interest in parks and park development is constantly growing. One, therefore, turns to this publication with the desire to know just what the community, of which the city of Newark is the center, has done. He is disappointed, however, to find that there is very little information about the parks themselves, and that he must go through over 200 pages of uninteresting matter to learn a few facts. It is apparent that Essex county has acquired a valuable park system; but the trials and tribulations through which the organizers went is of little importance to the outsider. The essential fact seems to be that for an expenditure of about \$5,000,000 Newark and the Oranges have acquired a fine park system. This outlay is apparently excessive, though no doubt the future will count the money well spent. The book cannot be recommended as valuable to anyone but those who care to know what difficulties are encountered in a work of this kind.

Forestry in Massachusetts. Second Edition. Bulletin No. 1, Forest Service of Massachusetts. By Alfred Akerman, State Forester. Pp. 19. Wright and Potter Co., State Printers, Boston, 1905.

This is an interesting little pamphlet designed to create an interest in forestry in Massachusetts and to set forth the aims of the State Forest Service and its work. The Forest Service of Massachusetts was only established in 1904, but already it has accomplished considerable, and in the future, when it secures even more general support,

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Forestry and Irrigation

H. M. SUTER, Editor

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THE SAWKILL FALLS, NEAR MILFORD, PA.

One of the many beautiful views in the vicinity of the Yale Summer School of Forestry
(See page 122)

Forestry and Irrigation.

VOL. XII.

MARCH, 1906.

No. 3

NEWS AND NOTES

Write to Your Congressmen

The bill for national forest reservations in the White Mountains of New Hampshire and the Southern Appalachian Mountains, has been introduced in the present Congress. The Senate Committee on Agriculture and Forest Reserves has reported favorably upon the measure and the House Committee on Agriculture is to consider the bill at a hearing on April 11. Readers of FORESTRY AND IRRIGATION are earnestly urged to write their representatives in Congress, or their senators, and urge their support of this measure. Say that you earnestly desire that these forest reservations be established, and ask them to see Speaker Cannon and urge upon him the importance of securing a vote on this measure at the earliest possible day. The time for concerted action is at hand.

Wholesale Lumber Dealers Meet

The Fourteenth Annual Meeting of the National Wholesale Lumber Dealers' Association, held in Washington on March 7 and 8, was remarkable for the keen interest shown in practical forestry by the members of this powerful organization. The session on Thursday morning, March 8, was almost entirely given up to the discussion of forestry as applied to the lumber industry. The session began with the report of the association's committee on forestry, which was presented by its chairman, Mr. George F. Craig, of Philadelphia. He was followed by Mr. Gifford Pinchot, head of the U. S. Forest Service, who spoke of the government forest work and the desire

of the Service to co-operate in every way possible with the lumbermen of the country. Mr. Alfred Gaskill, of the Forest Service, then read an interesting paper on "How Shall Forest Lands Be Taxed?" In the afternoon, President Roosevelt received the delegates to the convention in the East Room. He shook hands with each of the delegates and made the following address:

"I wish to state what a very real pleasure it is to have the chance of greeting this body here on this occasion. I hope I need not say the very deep interest I take in not only your business itself but in the way in which you are carrying it on. I want to congratulate you with all my heart, and I congratulate the country upon the way in which the exceptionally intelligent and energetic men who have been engaged in lumbering have met and are meeting the changed conditions of their business; they way in which they are now seeking to put it upon a footing not of exploiting a given area of forest and leaving nothing behind, but of so handling the forest that in using it it is yet left as an asset for their children and children's children.

"The great desire I have in connection with the government forest service is that you lumbermen should make the fullest use of that service, and I think I need not say that it is absolutely at your disposition, and that the more you use it, the more you work in conjunction with those engaged in managing it, the better it will be for the service, and I think for you. I am pleased to learn that you are to

help in establishing a chair in lumbering at Yale.

"There is no business in the United States in which there is greater need of having it carried on with a combination of scientific understanding and practical horse sense. And, after all, that is the way in which every successful business, including the business of governing, has got to be carried on."

Nebraska Notes

The Nebraska Park and Forestry Association's annual meeting, held at

Lincoln recently, was a very successful affair. Those on the program were Prof. A. E. Burnett, director of the Nebraska experiment station; Mr. C. S. Harrison, president of the association; Prof. N. E. Hansen, of South Dakota; Mr. E. C. Bishop, assistant superintendent of public instruction for Nebraska; Mrs. H. M. Bushnell, president of the Nebraska Federation of Women's Clubs; Prof. Charles E. Bessey, Prof. R. A. Emerson, and Chas. A. Scott, Wm. H. Mast and Frank G. Miller, of the Forest Service. The establishment of a state park and a state forest nursery were among the more important questions discussed.

Mr. Charles A. Scott delivered a special course of twelve lectures to the students of forestry in the University of Nebraska in January. The course included a discussion of the methods of gathering forest tree seeds, nursery practice, field planting, and forest policy. The closing address, by special request of the city teachers, was an illustrated lecture on "Forest Industries." Mr. Scott has been engaged for a similar course next year.

Fixing Control of Reclamation Work

A notable bill, designed to prevent any possible abuse of administrative power, has been introduced in the House of Representatives by Mr. Cooper of Pennsylvania in connection with the operations of the Reclamation Act. There is probably no law on the statute books which puts in the hands of a single official of the government such unlimited powers of expenditure

as the act devoting the proceeds from the sale of public lands to the construction of reclamation works. Prominent statesmen, both inside and out of Congress, and leading newspapers have called attention to the great possibilities for maladministration, while at the same time they have joined in commendation of the wisdom and conservative policy of the present Secretary of the Interior. In view of the fact that no one man can be expected to remain indefinitely in charge of these great responsibilities, it seemed wise at the present time while everything is progressing well to make a provision of law such that Congress shall give attention annually to the expenditure of the reclamation fund. This fund at present amounts to \$30,000,000.

With this thought in view, Mr. Cooper, after an inspection of the work in the field, has introduced his bill (H. R. 16312), providing for the more complete placing of responsibilities in administration of the reclamation fund. This bill confirms the present practice which has proved successful—that is, that of making the director of the Geological Survey the director of the Reclamation Service, and provides that he shall remain as such until some other person is designated by the President to fill the office of director of the Reclamation Service. The bill also provides that the director shall submit annual estimates of expenditures to be made, so that Congress may have full information on this point. It in effect places the responsibilities of distributing the fund where it belongs—that is, with Congress—and to that extent relieves the executive officers from the endless worry and annoyance incident to the wise apportionment of the fund.

It is believed that Mr. Cooper's bill will have the support of the leaders in Congress, as well as that of the higher executive officers who are conversant with the established system. It is not intended as a reflection upon the existing order of things, but, on the contrary, serves to crystallize the methods which have been found to be desirable and to put on the statute books a more

definite recognition of the responsibilities of Congress and of the administrative officers of the government.

Meeting at Charlotte, N. C. On March 3, at Charlotte, N. C., an interesting and important meeting was held in the interest of forestry. Three sessions were held in the morning, afternoon and evening, and a number of those prominent in the forest movement, and particularly in the

Gaskill, of the Forest Service; Mr. F. H. Newell, chief engineer, United States Reclamation Service; Prof. J. A. Holmes, state geologist, and others.

In the morning a reception was tendered by the Southern Manufacturers' Club; the afternoon session was held at the Academy of Music, at which a number of excellent addresses were made. Stress was laid upon the importance of conserving the forests, lest



View Showing the Remaining Portion of the Arizona Dam, which was Washed Away by the Flood of April 13, 1905.

effort for the establishment of the Appalachian Forest Reserve, were present and spoke. These included Governor Glenn of North Carolina, who presided at all sessions; Governor Terrell of Georgia, Mr. Gifford Pinchot, chief of the United States Forest Service; Mr. C. A. Schenck, director of Biltmore Forest School; Dr. W. Gill Wylie, president of the Southern Power Co.; Mr. Alfred Akerman, state forester of Massachusetts; Mr. Alfred

the water powers of the South—so vital to its welfare—be dangerously impaired.

The evening session was more largely attended, and a distinctly "popular" program was offered, probably the most interesting portion of which was an illustrated lecture on forest preservation by Prof. J. A. Holmes. Excellent addresses were made by Dr. J. Hyde Pratt, of Chapel Hill, N. C., assistant state geologist; Mr. Fred C.

Bates, of the General Electric Company; Prof. H. D. House, Mr. W. S. Lee, jr., Dr. Collier Cobb, Governor Glenn, and others.

The most important feature of the meeting was the decision to appoint a committee to urge the passage of the bill now pending in Congress providing for forest reserves in the Southern Appalachian and White Mountains. Governor Glenn was selected chairman of this committee and requested to select the same, asking the Governors of Virginia, West Virginia, Pennsylvania, Maryland, Tennessee, North Carolina, South Carolina, Georgia, Alabama, and each of the New England states to co-operate with him in the appointment of such a committee.

Interest in forestry in the South is slowly taking root, and judging from the excellent resolutions adopted at this Charlotte meeting, and the evident interest of all present, the time is not far off when the South will come to a realization of the importance of husbanding its timber resources.

**Yale
Student for
South Africa**

Captain George Adelbert Wilmot of the class of 1906 in the Yale Forest

School has just been notified by the colonial government of the Cape of Good Hope in South Africa of his appointment as an assistant instructor in forestry and lecturer in forest law in the newly established forest school at Cape Town.

Captain Wilmot, who was educated at the University of Dublin, gave up his studies in forestry to join her majesty's forces in the Boer war, in which he served with distinction, retiring with rank of captain. After the close of the war he resumed his work in forestry under the colonial government, which offered to send him to any of the different schools that he might elect. After canvassing the ground thoroughly and after considerable correspondence with Prof. Henry S. Graves, the director of the Yale Forest School, he finally chose the Yale Forest School as the best suited to his pur-

pose, and has repeatedly expressed himself as more than satisfied with his choice. He also desired to study our methods of planting, as the main problems of the South African forester are those of afforestation. Since his arrival here in the fall of 1904 he has spent his vacations in traveling about the country examining our work in forestry, and particularly our experiments in tree planting in the Middle West. He is just now leaving, at the request of his government, and by the courtesy of the authorities of the Yale Forest School, to study the conifers of temperate Mexico. The climate conditions there being somewhat similar to those in South Africa, it is hoped by the officials of the South African government that some of the Mexican conifers may be found suitable for planting in South Africa. Upon his return from Mexico, Captain Wilmot will proceed to Germany for a brief period of study there, after which he will go on to Cape Town to take up his work in the newly established forest school.

**Reclamation
Fund
Threatened**

Following the lead of Senator Hansbrough's bill to divert a million dollars from the reclamation fund for drainage in his state of North Dakota, other congressmen, especially in the east, are waking up to the opportunities such a lead presents. Representative Small has introduced a bill to take \$1,000,000 from the reclamation fund to drain the historic Dismal Swamp in Virginia and North Carolina. If funds are diverted for these projects, why not use the reclamation fund for reclaiming the swamps of Florida, Louisiana, Arkansas, and a long list of others? Active efforts along these lines may prove successful, but the plan of developing the arid West would in this way receive a mighty serious setback. The reclamation fund has been judiciously distributed by the Secretary of the Interior so as to provide for the utilization of the fund, including the estimated receipts for the next three years, in order that the

work may be carried on as the funds come in from year to year. This provides for the finishing of the first sections of various projects. The proper completion of the plans of work already started necessitates the use of the funds that will be received for a number of years. Any disturbance of the equilibrium now established will require the curtailing of some projects and the abandonment of others. The selection must be made from those that would involve the least loss to the government. The disturbance of comprehensive plans for spending \$30,000,000 cannot be otherwise than disastrous to the West in general.

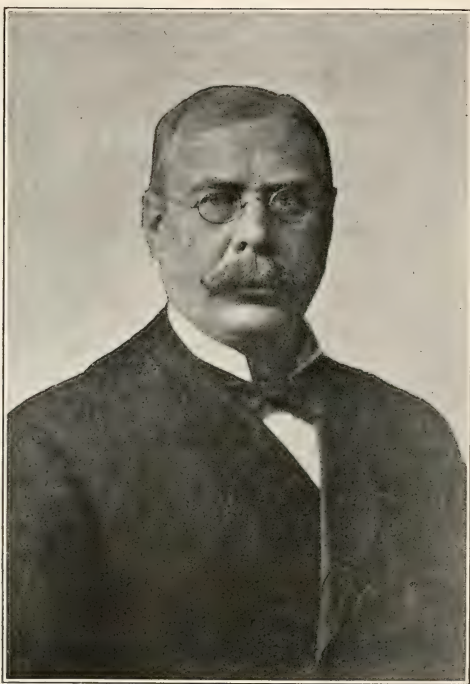
No one disputes the immense value that would be created by draining the swamplands of the country. But for this purpose a bill has been introduced in Congress by Representative Steenerson of Minnesota, drawn along the sensible, practical lines of the National Reclamation Act of June 17, 1902. Its passage and administration will bring about the drainage of swamplands throughout the country on an immense scale, without diverting a single penny from the present Reclamation Fund. This bill, described elsewhere in this issue of FORESTRY AND IRRIGATION, ought to command the support of everyone interested in the highest development of the country.

To Buy Salt River Canals

The Secretary of the Interior has given his approval to a contract for the purchase by the government of the entire system of canals on the north side of the Salt River Valley, Arizona, in the center of which is Phoenix, the capital of the territory. These canals now become an integral part of the Salt River Project and will be remodeled into an ideal system of distribution by which to irrigate 125,000 or more acres of rich, fertile land. This disposition of the matter has been brought about as a consequence of the disastrous floods in the Salt River Valley last spring. Among other things

the flood carried away the Arizona dam. As a result the company owning the dam has been unable to furnish water and the farming operations of many persons in the Salt River Valley have been in serious danger. The action of the government in deciding to take over this irrigation system is in accord with its policy to acquire all possible water rights in regions affected by its own projects, thereby avoiding useless and costly litigation.

Now that the Secretary of the Interior has decided that there is no obstacle to the approval of the contract for the purchase of the Arizona canal system, it is an appropriate time to recognize the invaluable services of Mr. B. A. Fowler, president of the Salt River Valley Water Users' Association, in meeting and overcoming the numerous difficulties that have beset the consummation of these negotiations. Mr. Fowler's work in this connection cannot be fully appreciated except by one who has been on the ground and who has been cognizant of the many different phases which the matter has at various times assumed. The officers of the government are, of course, bound by the rules of regular and orderly procedure, and while they have consistently endeavored to do everything that was officially possible to expedite the negotiations, the numerous delays incident to such matters could have been overcome only by tactful and persistent effort. Mr. Fowler kept in touch with the proceedings at every stage and by his attention, patience and persistence aided in disposing of many difficulties that would otherwise have caused great delay. The fact that these negotiations have been closed within two and one-half months, instead of taking twice that long, is unquestionably due almost solely to Mr. Fowler's presence in Washington and to his untiring efforts. The people of Salt River Valley should understand and appreciate this.



HON. HALVOR STEENERSON, of Minnesota
Author of Government Drainage Bill

Representative Steenerson, champion of the drainage measure, which is elsewhere described in this issue of FORESTRY AND IRRIGATION was born June 30, 1852, in Dane County, Wis. His parents removed to Minnesota the following year, and he later grew up in Houston county, studying in the common schools of his section. Completing his education there he entered upon the study of law, and in 1878 was admitted to the Bar in the Supreme Court of Illinois, after a course of study at the Union College of Law in Chicago. The same year he was admitted to the Minnesota bar, and soon after removed to Crookston, Minn., and began the practice of his profession there. In 1880 he was elected county attorney; and in 1882, State Senator. He attended the Republican National Conventions of 1884 and 1888 as a delegate, and was elected to the 58th Congress and re-elected to the 59th.

THE KLAMATH PROJECT

An Immense Reclamation Scheme in California and
Oregon Combining Irrigation and Drainage Works

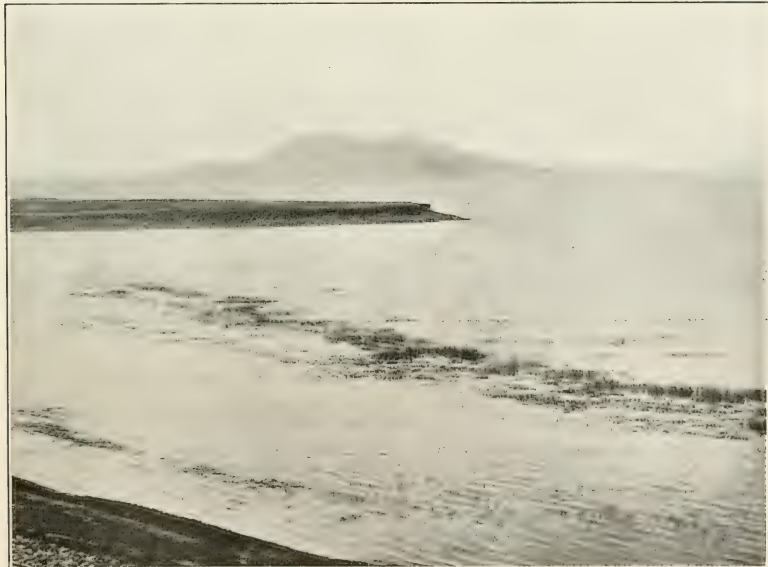
BY

H. L. HOLGATE

U. S. Reclamation Service.

IN the rock of rough marble the sculptor saw an angel. His practised hand chiseled away the imprisoning stone, revealing to the world a figure of beauty. With an equal prescient eye the United States Reclamation Service sees in the Klamath plateau of Southern Oregon and Northern California, a land of thousands of prosperous farm homes, and with equal skill the engineers of the service will reveal the agricultural possibilities of this undeveloped region.

Under the Klamath Project, the official name of this irrigation scheme to be constructed by the government, lie 250,000 acres of irrigable land. About 145,000 acres are in private ownership and 105,000 acres are government lands. The public lands will be subdivided into tracts averaging 80 acres in extent, and under the law the private lands must be subdivided into farms not exceeding 160 acres under one ownership. The average size of all the farms will prob-



Tule Lake, Oregon and California; the future site for 1000 farms of 80 acres each. To be drained and irrigated as part of the Klamath project by the U. S. Reclamation Service.

ably be less than 100 acres and the total number of farms will be something more than 2,500. These farms and the immense timber resources of the country will easily support a population of 50,000 people.

The engineers of the service are not here confronted with difficult engineering problems. The water supply is abundant and nature has provided the necessary reservoirs. The larger area of irrigable land, about 190,000 acres,

Klamath Lake. This latter lake extends from Klamath Falls, Oregon, to Laird, Siskiyou County, California, a distance of twenty-five miles. The depth of water varies from one to twelve feet and a heavy growth of tules marks the greater area. The lake has an elevation of 4,086 feet and an area of about 80,000 acres. Except for a large drainage channel, which will probably be navigable, Lower Klamath Lake will be reclaimed by



Link River, Oregon, Outlet of Upper Klamath Lake.

will be supplied with water drawn from Upper Klamath Lake, situated in Klamath County, Oregon. This lake has an area of 60,000 acres, an average depth of about 8 feet and an elevation of 4,142 feet. The lake receives the drainage of an immense water shed. Its only outlet over a rim-rock is Link River, a stream which has a length of about one mile and a fall in that distance of 56 feet, emptying into Lower

drainage and evaporation and subsequent irrigation. Its outlet at Keno into the Klamath River will be deepened twelve feet by a rock cut.

The second reservoir is Clear Lake, in Modoc County, California, where a restraining dam must be constructed. The outlet of the Lake is Lost River, which flows north through rich valley lands in Oregon and then turns south, emptying after a course of sixty miles

into Tule Lake, situated partially in Oregon but chiefly in California. Clear Lake has an elevation of 4,533 feet. Its waters will be utilized in irrigating about 60,000 acres of land in Langells, Yonna, and Poe Valeys. Lost River, upon leaving Poe Valley, debouches upon the Klamath plateau and from this point its waters will be diverted, through a drainage channel into Klamath River, thus depriving

undertaken. The government is ready to advertise for bids for the initial work and construction will probably begin this year.

There will be no public land under the project subject to entry for several years. The government holdings are practically confined to the water-covered lake lands and will not be thrown open to entry until fully reclaimed and ready for cultivation. As



Sage Brush Lands in Klamath Basin, Oregon and California ; to be Reclaimed by the Klamath Project.

Tule Lake of its source of supply. It is expected that by evaporating 50,000 acres now covered by the waters of Tule Lake which has no surface outlet, will be reclaimed.

The estimated cost of the reclamation system is \$4,500,000, or an average cost of \$18 per acre, the smallest cost per acre of any project whose construction the government has yet

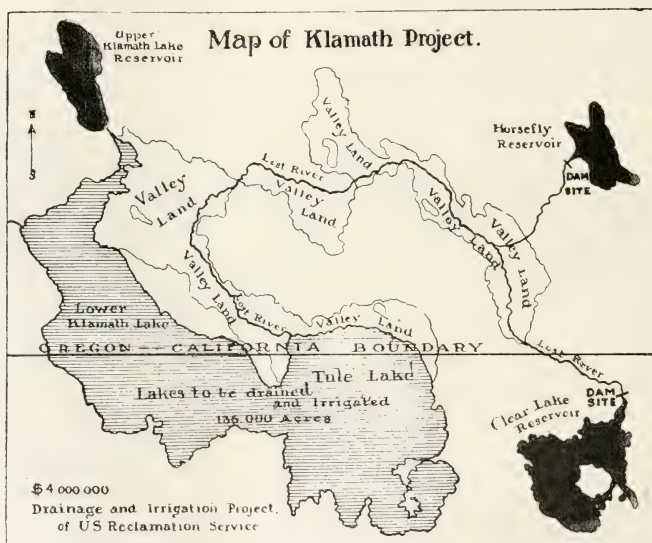
the government will not sell a water right for more than 160 acres to any one person, a considerable acreage of the private holdings is upon the market at prices ranging from \$10 to \$50 per acre, depending upon the amount of improvements, state of cultivation, quality of soil and nearness to market. For particular information relative to land the officials of the Reclamation

Service refer inquiries to the Secretary of the Klamath Water Users' Association, Klamath Falls, Oregon.

The growing season, owing to the high altitude and consequent frost, is comparatively short, but the soil is very fertile and the grasses, grains, vegetables and hardier fruits are successfully grown. Great areas of mountain and hill country stretch away in every direction, affording excellent outrange, and even under present con-

fir forests tributary to Upper Klamath Lake range from ten to fifteen billion feet.

The climate is healthful and attractive. Many delightful nooks and corners, forest-covered mountains, expansive lakes and crystalline, trout-stocked streams tempt the city folk who take summer outings; and not the least important is the beautiful and mysterious Crater Lake—one of the wonders of the West. The shotgun devotee finds



ditions some 25,000 head of beef cattle are driven to market annually. Klamath county sells each year to the United States Army horses which bring from \$125 to \$150 each. Beets grown experimentally show a high percentage of sugar. Tests show the tule soil to be extremely rich and especially adapted to the growing of celery, asparagus, potatoes and fodder for dairy animals.

The timber resources of the Klamath region are enormous. The estimates of experts as to the pine and red

nowhere such duck, geese and swan shooting as these mountain lakes afford.

The Klamath country is one of vast undeveloped resources of immense possibilities. With the construction of the government irrigation system and the building of railroads to carry the products to market, both achievements of the immediate future, golden opportunities for the farmer, the stockman, the manufacturer and the business man will present themselves.

HOW SHALL FORESTS BE TAXED^a

PART I — Inequitable Taxation Responsible for Much Forest Destruction

BY

ALFRED GASKILL

Forest Inspector, U. S. Forest Service.

THE SITUATION.

IT is generally admitted that taxation in the United States is as faulty in principle and in practice as it can well be. A well-known writer,* in discussing the situation, says: "The outcome of all this is a system which powerfully contributes to arrest and hinder natural development, to corrupt society, and is without parallel in any country claiming to be civilized." This approach applies with especial force to the taxation of woodlands, because the present practises favor and encourage the untimely or wasteful use of standing forests, discourage the propagation of others, and tend to hasten the time when the country shall be forced to face a wood famine.

The present paper, however, aims at no radical reorganization of the tax system. It simply presents the situation as it concerns the forest interests, makes several suggestions that seem to be reasonable and not impracticable, and invites a full discussion of the subject. The problem is intricate, and perhaps on that account has failed to receive the attention it deserves, but the time has arrived when its consideration can be put off no longer. The welfare of every State requires that it be faced. No other question concerning the woodlands of the country, save that of fires, is so important, and we shall make little substantial progress in the effort to induce private owners to maintain their forests until the present condition shall have been relieved, and the

forests be so rated that they shall bear no more than their fair share of the cost of government.

It is true that the virgin forests of the South and West have not yet felt the burden of overtaxation to any great extent, but the cut-over lands do feel it. In all the older States, those wherein lumbering has greatly enhanced timber values, the tax levied upon standing timber is often a warning to the owner that he must cut it or run the risk of great loss, and when he has cut it the bare land is taxed so high that he is forced to abandon it.

A few attempts to correct the evil, through partial exemption, rebates, or bounties, have been made. But, though such measures may serve for a beginning, the real need is for laws that, recognizing the public utility of forests, adjust the necessary tax levies to the facts and conditions that govern tree growth, and to the long periods of time that are required to produce timber.

In general, it is assumed that taxes are imposed for the protection of person and property as well as for public necessities, yet rarely is the obligation extended to woodlands. The forest is not only allowed to go unguarded, but everyone may tramp and camp therein and do almost what harm he will. The common law and statutes relating to forest depredations are notoriously disregarded, and, though the conditions in some parts of the country have been bettered of late years, private forest and public suffers much

^a Paper read before The Society of American Foresters.

*David A. Wells, "The Theory and Practice of Taxation," p. 395, 1900.

damage from careless and malicious sojourners.

HOW FORESTS ARE TAXED.

Under the common practice of intrusting to local officers the levying of taxes upon real estate, forests are assessed, almost without exception, on the basis of agricultural land; that is, the land is estimated to have a certain value if cleared, and the standing timber is worth so much more, or is viewed as an encumbrance. The latter case is by no means rare in hardwood sections. In many instances, perhaps in most, the assessment is fair so far as the value of the property is concerned. In many others it is far too high, because the land is not fit for farming and therefore valueless except to grow trees. At the same time, the timber often has only a potential value, since it can not be marketed for want of roads or some other temporary unreadiness. The argument is entirely apart from the admitted inability of many of the assessors to truly value woodlands, and who therefore resort to guessing, and from the quite general belief that in cases where the owner is a corporation or a nonresident with no local interests, the property may be taxed to the limit. These things are not to be avoided under any system. In short, whether the assessment be made fairly or unfairly, the forest is considered a form of property which should be realized on at the earliest possible moment, and the more it can be made to yield to the county prior to its extinction the better for the county.

One can easily understand the temptation that confronts the assessors in regions where everything is wanted—roads, schools, public buildings—to use the taxing power for present advantage, yet instances are plenty of communities established on the re-

turns from forest property and utterly abandoned as soon as the original timber was all cut. The few farms that had been taken could not keep up the roads and other public works.

But the wisdom or unwisdom of raising a revenue once for all upon forests is only a part of the question. True forest land is not farm land uncleared, and a forest is not the crop of a season. The problem concerns itself chiefly with those areas which, in their nature are fit only for tree growth, and with a crop representing the accumulated investment of the owner for as many years as were required to bring the trees to maturity. If a man buy a mature forest, he acquires the investment of another; if he plants, or waits for a natural one to grow, he gets no return for many years. In either case, his forest serves the public by providing a common necessity—wood—and by the beneficial influences that it gives freely.

These considerations make it apparent that forests occupy, or should occupy, a separate place on the tax list; that they need to be treated differently from farms and town lots and mines. In fact it will be necessary to show that growing trees should be considered personal property, not real estate, as the are now by practice or law in virtually every State of the Union.*

RATES OF TAXATION.

Without going deeply into details, a few instances may be given to show how the present methods tend to rid the forest owner of all but a temporary interest in his property, and, instead of encouraging the practice of forestry and the maintenance of the forests, put a premium on destructive lumbering.

A competent authority says that "in Wisconsin the taxes on forest property

*The language of the statute of Massachusetts is: "Real estate, for the purpose of taxation, shall include all lands within the State and all building and other things erected on or affixed to the same." The statute of New York declares, "The term land shall be construed to include the land itself, all buildings, structures, substructures erected upon under or above, or affixed to the same; all wharfs and piers * * * all trees and underwood growing upon land; * * *."

have been for years 3 cents to 40 cents per acre, without reference to changes in its condition or value."† Forty cents is not unreasonable for an acre of forest containing 20,000 feet of white pine, since it represents a rate of but 4 mills if the stumpage is worth \$5 per thousand, but of course no owner would pay it after the timber had been logged unless he could reasonably expect to sell the land for farming. As a matter of fact, 37 per cent of the area of the State, once forested, consists of land too poor to be farmed, and may be bought for 25 to 50 cents per acre.‡

The forest commissioner of Pennsylvania writes that on one of the few pieces of virgin forest still standing in the State, containing a little less than 1,000 acres, the annual tax is \$2.83 per acre. If the whole tract average 20,000 feet per acre of white pine worth \$10 a thousand on the stump—both estimates are high—the tax is 1.4 per cent of the value, or, counting the assessed value at two-thirds the sale value, as is the common rule, the yearly tax is over 2 per cent, and the owner assumes all the risk of loss by fire and depredation.

The same authority states that denuded lands are commonly assessed at 50 cents to \$1.25 per acre, and that the usual levies amount to 25 to 30 mills. This means a yearly tax of $1\frac{1}{4}$ to $3\frac{3}{4}$ cents per acre. If the soil is capable of agriculture the burden is not great, but much of it is absolute forest land, and the owners often prefer to surrender it rather than pay the tax. The State forest reserve commission has bought at tax sales over 23,000 acres of such land for the accrued taxes and costs. In some cases these have been as low as $2\frac{1}{2}$ cents per acre, though the average is somewhat higher. The commissioner instances one case where several parcels containing over 7,000 acres were bought in for a fraction over 8 cents per acre.

These figures are suggestive. They prove the passing of the forest in a State whose name indicates its original character, not entirely by the hand of the lumberman, but largely through the operation of its laws. They prove that a county as a landowner is poorer than as the recipient of even small tax on that land. They prove that there is much land unfit for agriculture which presumably will bear forest, since it already has done so. They prove that the State which has bought a forest reserve now amounting to 700,000 acres, and is still buying, and which has made many worthy efforts to advance the cause of forestry, has still failed to secure the co-operation of private owners to any great extent because it persists in taxing their lands, especially their cut-over lands, at a rate that is unreasonable.

In North Carolina conditions are not much different. The common levy is 1 per cent on a 60 per cent valuation, or 6 mills on the estimated value. Where this value is justly assessed, there can be no reasonable complaint, but there is much guessing, and in one county it is reported that land partly lumbered or cut over as the forester advises, is taxed 25 per cent higher than virgin forest, on the ground that it is improved land. In other words, a penalty is imposed on conservative lumbering!

On the Pacific Coast a similar situation is found. The actual value of the great standing forests is undetermined and steadily growing, so that there is probably little overtaking of virgin timber, but the burden on cut-over land is so great that large areas are relinquished every year. Some of this land may be taken up by settlers, but the rule is that when the counties become the enforced owners it remains unproductive, uncared for, and during the dry season a constant source of dangerous fires. A study of this question made in the State of Washington

† B. E. Fernow, *Economics of Forestry*, p. 252, 1900.

‡ Bulletin 16, Division of Forestry, Table II and p. 54, 1899.

in 1900 developed the facts that in nine counties logged land was assessed 25 per cent to 50 per cent as high as that bearing standing timber and that much of it was abandoned on that account. In two counties 20 per cent of the logged land had been surrendered and in another 71 per cent.* A recent report from that section states that the sale value of logged land is rarely as high as the assessed value.

The figures given above will have more meaning, perhaps, if they be compared with what a forest can yield. Say that an acre of land produces in eighty years 7,000 feet board measure of lumber, worth \$49 on the stump, and that a tax of 2 cents is paid each year. If money be worth 5 per cent, the 2 cents paid annually eighty times amounts to \$19.42, or 40 per cent of the value of the crop!

INDUCEMENTS TO FOREST OWNERS.

In view of the facts that have just been stated, and of the very general interest manifested in forest preservation, it is reasonable to expect that the laws and practices of at least one state have been adjusted to the necessities of the situation. Unfortunately that is not the case, for, though many states have dealt with the subject within the

past thirty years, not one has framed a law of the right kind. Connecticut exempts from tax for twenty years plantations of certain specified trees made on land not previously wooded; Wisconsin exempts shelter belts or wind breaks made and maintained in a certain way; Colorado, Indiana, Maine, Nebraska, New Hampshire, Pennsylvania, and Rhode Island give partial exemption on plantations or on *limited areas* of forest. None of the laws can apply to more than small woodlots. Illinois, Kansas, Wyoming, Minnesota and Wisconsin give bounties for tree plantations, and Massachusetts, Minnesota and Vermont offer premiums to encourage tree planters.

To these state measures is to be added the Federal act of 1873, known as the Timber Culture Law. This was intended to encourage tree planting on the public lands in the West, but was so abused that it was repealed in 1891.

The laws and practices of many states concerning the observance of Arbor day evidence the desire and intent of the people to foster the growing of trees, but at the same time they prove the entire insufficiency of such measures to support one acre of commercial forest or to maintain existing woodlands for the common weal.

SUMMER SESSION OF THE YALE FOREST SCHOOL

Description of the Equipment and Daily Life
at this Unique and Valuable Institution

BY

CHARLES S. JUDD

THE student entering the Yale Forest School will begin his course with the summer work at Milford, Pa. He will reach this pretty little village by an eight-mile stage ride from Port Jervis, at the junction of the states of

New York, New Jersey and Pennsylvania, or will drive up the valley from Bushkill, which is about ten miles north of the Delaware Water Gap.

He will find the camp situated on high, dry ground about eight hundred

*E. T. Allen, "The Western Hemlock," Bulletin 33, Bureau of Forestry, p. 37.

feet above sea level, a location which is exceedingly healthful, and which commands a splendid view of the Delaware River Valley near at hand and the even sky line of the Appalachian range, broken here and there by steep wooded valleys.

In a grove of young oak and hickory a double row of tents, each equipped with wooden floor, cot, table, chair, washstand and crockery, accommodates the thirty students of the junior or entering class and the twenty students in the summer school which is operated in conjunction with the regular work of the Yale Forest School.

used in the spring by the senior class and in the summer for all lectures which are open to the public. Besides these buildings, Mr. Pinchot has given Stone Cottage for the use of the summer school. This contains a lecture hall, botanical laboratory, a small library and a reading room. He has also provided a tract of about two hundred acres for experimental work.

A typical student begins at seven a. m. with breakfast; at eight o'clock a lecture by the director of the school is given on some topic in forest mensuration, such as the use of American log rules, the use of height measures and dendrometers, the construction and use



The Camp Buildings, Yale Summer School of Forestry

The school buildings consist of Junior Hall and the club house, both frame buildings, containing single large lecture rooms and huge fireplaces, which are for the work of the junior class in the courses in surveying and forest mensuration and for use as gathering places for evening study and recreation. A large open building serving as mess hall has also been erected by Mr. James W. Pinchot on this, his country estate. This philanthropic gentleman is now also having erected in Milford, Forest Hall, a large stone building which will contain a spacious lecture hall, which will be

of volume tables, or the methods of determining the contents of whole stands. Three lectures may be given in a day, with two hours off at noon for dinner, or else lunch is taken along into the woods and the entire day spent in taking sample plots, making valuation surveys, or cutting trees such as chestnut and pitch pine and making stem analysis.

Half of the week is spent in this manner and the remainder is occupied by the work in surveying under supervision of instructors from the Sheffield Scientific School of Yale University. Small squads may be sent out on a sur-

vey of the region about camp to establish transit lines, to find elevations of bench marks, to take details with the plane table or to run contour lines. The work extends even into the night, when observation must be made on the pole star to find the true north.

At five o'clock in the afternoon the work of the day is over, and at once a crowd of healthy young men makes its way across an open field to the gorge

or else talks are given by the men about their different colleges and interesting tales of strange and foreign lands are narrated. At these gatherings the young and companionable instructors join in, and a familiar and welcome person is Mr. Gifford Pinchot, the head of the United States Forest Service, who from time to time visits the camp. As the glowing embers burn low and the blackness grows



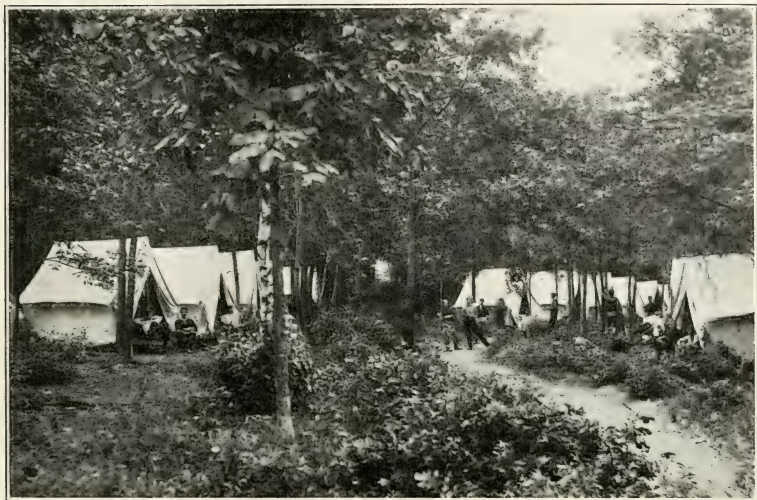
Students at Work in the Woods

of the Sawkill River, where a refreshing bath is enjoyed in the cool and turbulent waters just above the famous falls.

Immediately after the six o'clock supper the base ball team has its short but snappy practice, for recreation in camp is not neglected. As darkness comes on a huge campfire is built and chairs are drawn about in a semi-circle. The crowd sings college and popular songs, diversified by individual talent,

deeper the session breaks up and the fellows move off to their tents, guided by their lanterns, which look like fireflies flitting about in the darkness. The still of the night is broken only by the harsh notes of the katydids as the foresters drop off into well-earned slumber.

Wednesday and Saturday afternoons are devoted to recreation, and there is usually a base ball game between the school team and some local



Part of the Camp, Yale Summer School of Forestry



The Beautiful Delaware River and Valley near Milford, Pa.

nine. Or else walks are taken to High Point, in New Jersey on the Kittatinny Ridge, to Raymondskill Falls, to the cliffs overlooking the pretty Delaware and to other points of interest, or the afternoon is spent in fishing in the lakes back in the country.

The association of the camp life in itself is a great education, for here are gathered together for one purpose graduates from numerous universities and other educational institutions, including Yale, Harvard, Princeton, Columbia, Cornell, University of Pennsylvania, Bowdoin, Rutgers, Norwich, Maine, Tufts, Wisconsin, Beloit, Biltmore, California, Massachusetts Agricultural College, DePauw University, Ohio Wesleyan, Ohio State, Toronto, Regna Nielsens (Norway), Katwijk

(Holland), and the University of the Cape of Good Hope. Here are brought together men from Maine to California, from Canada, England, Norway, South Africa and Hawaii. All of them have their own peculiar college ideas and customs deeply rooted, but these are subordinated for the new affiliation to a great university and it is surprising how quickly the spirit of adoption takes hold. It warms the heart of the "son of old Eli" to hear the foresters give, already in a familiar way, the snappy Yale cheer and sing their song:

Love to Alma Mater plighted
From where'er we hail
To that love is now united
Loyalty to Yale.

FOREST INTERESTS OF RHODE ISLAND

Much Land Can Be Made Productive Through Proper
Care of Natural Timber Growth and by Planting

BY

J. B. MOWRY

ACCORDING to the United States Soils Survey of Rhode Island of 1905, about two-fifths of the total area of the state, or 268,248 acres, consist of unimproved and abandoned farms. Much of this land was always unsuitable for agriculture and has now reverted to forest. Within the last half century the shifting of the grain and meat producing industries westward has greatly lessened the requirements of tillage and pasture lands in the state, but it is none the less important that the ever-increasing area of unimproved land should be put to the best possible use.

While doubtless some of this land is so ledgy and poor that it should be allowed to produce what growth it can naturally, there is also much land

where forest planting would prove very remunerative. Natural afforestation is a slow and often unsatisfactory process, and twenty years or more sometimes elapse before the land is fully covered with trees, many of these perhaps of the less valuable species. This delay, during which the land is producing little or no interest on the capital, is avoided by planting. Many instances could be cited of pasture land which, planted to pine and hardwoods at a very small outlay in time and money, has produced four or five times as much valuable timber per acre in forty years as would have grown by natural afforestation. While such a long investment tends to discourage the planter, he should not forget that land so planted to forest is yearly in-

creasing in its sale value, and in our state is wisely released from taxation for a period of fifteen years.

On those rugged ridges in western Rhode Island, where planting is unnecessary or unprofitable, the mixed forest of evergreens and hardwoods now existing could be much improved by judicious forest management. Very little of the wooded area of the state is producing as large a money return as it is capable of doing under less wasteful forest methods. Imported pine, oak, maple and walnut range higher in price per thousand feet board measure than our native product, which has become inferior in quality and dimensions.

To any student of the subject it is very evident that the nation's supply of white pine, our most useful timber tree, is fast decreasing. The valleys of our many small rivers are strewn with glacial eskers and hummocks—too light and sandy and well drained for profitable tillage, yet just the kind of land on which the pine reaches its highest development. The largest specimen of *Pinus strobus* thus far reported as standing in North America today, is in the town of Gloucester. Within the past few years thousands of acres of this sort of land have been denuded of their virgin pine and second growth, and with few, if any, mother trees left in the vicinity for re-seeding, are growing up to gray birch, scrub oak, red cedar and brush, with only a sparse intermixture of seedling pine. With better laws to protect against fire, this area could be made again to yield a heavy growth of timber, and, if taken in time under forestry methods, the tree weeds now occupying the ground would serve as a pioneer growth to furnish shade and protection to the young pine seedlings. Nature, with all the time since Noah's deluge, has produced on an average only about 5,000 feet board measure per acre of pine in states like Michigan, while experiment in New England has proven that five times that amount can be grown per acre and harvested by the man who in youth plants the pine seed.

The natural resources of the continents have in all ages for a time at least been squandered by man without regard for the future. Private enterprise usually has but one aim in the use of these resources, namely, to obtain the largest possible personal and immediate gain. The interests of future generations lie with the state. The state very properly guards against the exhaustion of its natural resources in fish and game—resources inconsequential as compared with its forests. By the adoption of a wise forest policy the state could not only enhance its forest wealth, but also incidentally increase the flow of the brooks and rivers upon which our varied industries depend for water power, and all this is possible without materially invading private rights so dear to the hearts of us descendants of Roger Williams. Indeed the state could in many ways instruct and encourage owners of woodland to their own personal profit.

Maine, New Hampshire, Massachusetts and Connecticut have already established bureaus of forestry which by educational and promotive measures are rendering valuable services to farmers, lumbermen and the community at large. Annual losses by fires have been greatly reduced by effective fire laws. A number of states are acquiring reservations, and in some instances are paying the town taxes on the same.

President Roosevelt says: "If the present rate of forest destruction is allowed to continue with nothing to offset it, a timber famine in the future is inevitable, and it is difficult to imagine what such a timber famine would mean to our natural resources, for there is a steadily increasing demand for wood even in our manufacturing industries. I am going to work with, and only with, the man who develops the country. Our policy is consistent to give to every portion of the public domain its highest possible amount of use, and, of course, that can only be done through the hearty co-operation of the people."

NOTES ON FOREST TREES SUITABLE FOR PLANTING IN THE UNITED STATES*

IV. The Russian Mulberry (*morus alba tatarica*)

DISTRIBUTION.

THE Russian mulberry is a hardy variety of the Asiatic white mulberry. It was introduced into the western states by the Russian Menonites about thirty years ago and has become widely distributed over the plains region. The range for its economic planting is southern Nebraska, Kansas, Oklahoma and Indian Territory. It cannot endure the cold winters of the Dakotas, and the leading shoots are often frozen back in Kansas.

CHARACTERISTICS OF FORM AND GROWTH.

The habit of growth of the Russian mulberry is low and bushy, hence severe pruning is required to make it develop a good trunk. Height and diameter growth are fairly rapid. A tree of this species growing near Fairbury, Neb., was found to measure eight inches in diameter and twenty feet in height when eight years old, but this growth is somewhat exceptional. Russian mulberry never attain great size, although it is said to reach three feet in diameter and fifty or sixty feet in height. In favorable situations it will produce fence-post timbers in ten years or less. The natural form of the tree makes it well suited to form a low, dense windbreak when left unpruned. It stands pruning well and may be made into an excellent sheared hedge.

ECONOMIC USES.

The Russian mulberry serves a number of useful purposes. The wood is heavy, elastic, coarse-grained and moderately strong. It splits easily

and, when seasoned, makes a very durable fence post. It also has a high fuel value. While the fruit is of inferior quality, it is much used for domestic purposes in the absence of better kinds. Many horticulturists like to have a mulberry windbreak around their orchards. Aside from being a protection from the wind, the berries furnish food for birds, so that they are less likely to eat the more valuable fruit in the orchard. It is a good tree to plant in the farm woodlot for posts and fuel.

The Russian mulberry will grow on either sandy or clay soils and can live through almost any amount of drought and neglect. It grows best on rich, loamy soil where the water table is ten to fifteen feet below the surface, but even in very dry situations growth is fairly rapid. These qualities adapt it to both upland and valley situations in the semi-arid regions. It is decidedly tolerant of shade and can therefore be used for underplanting or mixing with more rapid-growing species to increase height growth and aid natural pruning.

PROPAGATION.

Reproduction of the Russian mulberry takes place both by stump sprouts and by seed. Renewal after cutting is a simple matter. A quick-growing stump sprout will have better form than the original tree, and all the treatment that is necessary is to remove the surplus sprouts and give the best ones a chance to develop. Mulberry can also be reproduced by cuttings, but propagation from seed is easier, and produces better plants.

* Furnished by U. S. Forest Service.

Fruit is borne abundantly. The seed may be separated by crushing and washing the berries. After drying, the seed should be kept in a cool, dry place until a week or ten days prior to sowing. In case of very unfavorable conditions the seed may be sown as soon as it ripens, but generally the better practice is to wait until the following spring, so that the seedlings will have an entire season in which to grow before the coming of cold weather. The seed should be sown in good moist soil, and covered about one-half inch deep. One to two weeks or longer are required for its germination. Better results are obtained by mixing the seed with moist sand and keeping the mixture in a warm place until germination begins. The sand and seed can then be sown on a well-prepared bed. The seed can be given more even distribution by sprinkling the bed after it is sown. The bed should then be covered with one-eighth inch of sifted loam. The growth during the first season will be enough to make the little trees of proper size to transplant to the permanent situation the next spring. Planters who do not care to raise their own trees can get them cheaply at nurseries which handle forest seedlings. The price for one-year-old seedlings runs from \$1 to \$3 a thousand, depending upon the size and the nursery dealt with.

The Russian mulberry should be close-planted in order to overcome as much as possible its inherent tendency

to branched and crooked growth. For windbreaks it should be planted at about two-foot intervals; for timber plantations it may be set four feet by four feet. The best method, however, is to have the rows eight feet apart and the trees two or three feet apart in the rows. This spacing permits of easy cultivation, and at the same time gives a large number of trees to the acre. Cultivation should be given for at least three years after planting, and until the ground is entirely shaded.

ENEMIES.

The Russian mulberry is attacked by a number of fungi, only a few of which, however, are of economic importance. If injury by a fungus is suspected, the Bureau of Plant Industry of the Department of Agriculture should be consulted regarding a possible method of treatment, specimens being submitted for examination. Insects are sometimes destructive, particularly in the semi-arid plains, where swarms of locusts sometimes devour the foliage and even strip the bark from the trees. The fall webworm sometimes attacks the trees. Its leaves also serve as food for the silkworm (*Bombex mori*). When insect injury is serious, the Bureau of Entomology of the Department of Agriculture should be consulted regarding methods of control, specimens of the insects and their work being forwarded for identification.

FORESTRY AND IRRIGATION IN CONGRESS

Status of Bills on Forestry and Irrigation and Related Subjects on March 5, 1906

IN RESPONSE to many requests for information regarding bills on forestry, irrigation and related subjects there is given herewith a list of the bills introduced up to March 6:

APPALACHIAN AND WHITE MOUNTAINS FOREST RESERVE BILLS.

S. 34 (Sen. Gallinger)—Creation of White Mountains Forest Reserve.

Referred to Com. on Forest Reservations and the Protection of Game.

H. R. 181 (Rep. Currier)—Creation of White Mountains Forest Reserve. Referred to Com. on Agriculture.

S. 408 (Sen. Overman)—Creation of Appalachian Forest Reserve. Referred to Com. on Forest Reservations and the Protection of Game.

H. R. 40 (Rep. Brownlow)—Creation of Appalachian Forest Reserve. Referred to Com. on Agriculture.

S. 3504 (Sen. Elkins)—Creation of Appalachian Forest Reserve and Protection of Potomac Watershed. Referred to Com. on Agriculture and Forestry.

H. R. 5365 (Rep. Dovener)—Creation of Appalachian Forest Reserve and Protection of Potomac Watershed. Referred to Com. on Agriculture.

S. 4271 (Sen. Elkins)—Creation of Appalachian Forest Reserve and Protection of Potomac Watersheds in Appalachian Region. Referred to Com. on Agriculture and Forestry.

H. R. 13784 (Rep. Dovener)—Creation of Appalachian Forest Reserve and Protection of Potomac Watersheds in Appalachian Region. Referred to Com. on Agriculture.

FORESTRY AND FOREST RESERVES.

S. 2455 (Sen. Hansbrough)—Limiting time of entry of withdrawn lands upon restoration. Referred to Com. on Public Lands.

H. R. 10100 (Rep. Davis)—To provide for instruction in Forestry at Agricultural Colleges and experiments in forestry at Agricultural Experiment Stations. Referred to Com. on Agriculture.

H. R. 13930 (Rep. Gronna)—To amend the act repealing the lieu selection law. Referred to Com. on Public Lands.

H. R. 14177 (Rep. Fordney)—Grant to Michigan for State Forest Reserve. Referred to Com. on Public Lands.

H. R. 15440 (Rep. Huff)—To erect timber-testing laboratory for Forest Service. Referred to Com. on Public Buildings and Grounds.

H. R. 15919 (Rep. Lacey)—To provide for agricultural settlement in forest reserves. Referred to Com. on Public Lands.

S. 2457 (Sen. Hansbrough)—Sec. 2461 Revised Statutes U. S. regarding injury of living trees.

GAME PROTECTION.

S. 2966 (Sen. Perkins)—Protection of animals, birds and fish in forest reserves. Referred to Com. on Forest Reserves and the Protection of Game.

H. R. 7019 (Rep. Lacey)—Protection of animals, birds and fish in forest reserves. Referred to Com. on Agriculture.

H. R. 376 (Rep. Myer)—President to set aside public lands for game preserves. Referred to Com. on Public Lands.

S. 2732 (Sen. Smoot)—Protection of wild animals in Grand Canyon Forest Reserve. Referred to Com. on Forest Reserves and Protection of Game.

H. R. 15335 (Rep. Humphrey)—Protection of game birds and fish in Olympic Forest Reserve. Referred to Com. on Public Lands.

H. R. 13190 (Rep. Lacey)—To protect birds and their eggs in game and bird preserves. Referred to Com. on Public Lands. Passed House of Representatives. Referred to Com. on Forest Reservations and the Protection of Game in Senate.

NATIONAL PARKS.

S. 931 (Sen. Piles)—Appropriation for administration and improvement of Mt. Rainier National Park. Referred to Com. on Forest Reservations and Protection of Game.

H. R. 64 (Rep. Cushman)—Appropriation for administration and improvement of Mt. Rainier National

Park. Referred to Com. on Public Lands.

S. 3245 (Sen. Patterson)—To create Mesa Verde National Park. Referred to Com. on Public Lands. Reported without amendment.

H. R. 5998 (Rep. Hogg)—To create Mesa Verde National Park. Referred to Com. on Public Lands.

S. 3247 (Sen. Patterson)—To create Royal Gorge National Park. Referred to Com. on Public Lands.

H. R. 4545 (Rep. Brooks)—To create Royal Gorge National Park. Referred to Com. on Public Lands.

H. R. 8966 (Rep. Lacey)—To create Petrified Forest National Park. Referred to Com. on Public Lands.

H. R. 7017 (Rep. Needham)—Transfer of National Parks from Secretary of Interior to Secretary of Agriculture. Referred to Com. on Public Lands.

S. 4698 (Sen. Patterson)—Preservation of American Antiquities. Referred to Com. on Public Lands.

H. R. 11016 (Rep. Lacey)—Preservation of American Antiquities. Referred to Com. on Public Lands.

GRAZING.

H. R. 439 (Rep. Stephens)—Authorizing Commissioner of General Land Office to lease public grazing lands. Referred to Com. on Public Lands.

H. R. 10509 (Rep. Curtis)—Authorizing Secretary of Interior to lease public grazing lands. Referred to Com. on Public Lands.

H. R. 12068 (Rep. Kinkaid)—Authorizing Secretary of Interior to lease public grazing lands proclaimed by President. Referred to Com. on Public Lands.

H. R. 15916 (Rep. Reeder)—Authorizing Secretary of Agriculture to lease public grazing lands. Referred to Com. on Public Lands.

IRRIGATION.

S. 87 (Sen. Heyburn)—Provision for locating townsites in irrigation districts. Referred to Com. on Irriga-

tion and Reclamation of Arid Lands. Passed Senate. Referred to Com. on Irrigation of Arid Lands in House and reported with amendment.

S. 276 (Sen. Fulton)—Purchase and condemnation of irrigable lands. Referred to Com. on Irrigation and Reclamation of Arid Lands.

S. 539 (Sen. Carter)—Restoration of lands reserved for irrigation projects. Referred to Com. on Public Lands.

S. 3687 (Sen. Hansbrough)—Appropriation of \$1,000,000 for drainage of North Dakota lands. Passed the Senate. Referred to Com. on Public Lands in House.

H. R. 13197, H. R. 14891 (Rep. Gronna)—Appropriation of \$1,000,000 for drainage of North Dakota lands. Referred to Com. on Irrigation of Arid Lands.

S. 4452 (Sen. Warren)—Secretary of Agriculture to investigate utilization of small water supplies. Referred to Com. on Agriculture and Forestry.

H. R. 9728 (Rep. Mondell)—Secretary of Agriculture to experiment with limited water supply. Referred to Com. on Agriculture.

H. R. 12698 (Rep. French)—Secretary of Agriculture to experiment in dry farming. Referred to Com. on Agriculture.

S. 4624 (Rep. Carter)—Relative to irrigation rights of way. Referred to Com. on Public Lands.

H. R. 13940 (Rep. Dixon)—Concerning irrigation rights of way. Referred to Com. on Public Lands.

H. R. 222 (Rep. Bonyng)—Relative to taxation, homesteading, and sale of federal lands within irrigation districts. Referred to Com. on Irrigation of Arid Lands.

H. R. 444 (Rep. Stephens)—Extending irrigation law to Texas. Referred to Com. on Irrigation of Arid Lands.

H. R. 14184 (Rep. Smith of Texas)—To extend irrigation act to Texas.

- Referred to Com. on Irrigation of Arid Lands. Reported without amendment.
- H. R. 8429 (Rep. Smith)—To amend Reclamation Act by extending law to Texas and for other purposes. Referred to Com. on Irrigation of Arid Lands.
- H. R. 9747 (Rep. Stephens)—Secretary of Agriculture to make irrigation experiments in Texas. Referred to Com. on Agriculture.
- H. R. 8439 (Rep. Martin)—To amend Reclamation Act regarding construction by contract, hours of labor, etc. Referred to Com. on Irrigation of Arid Lands.
- H. R. 3071 (Rep. Dixon)—To encourage reclamation in Montana. Referred to Com. on Public Lands.
- H. R. 16007 (Rep. Steenerson)—Providing for reclamation of swamp land. Referred to Com. on Public Lands.
- S. 2560 (Sen. Ankeny)—Authorizing disposition of surplus and allotted lands on Yakima Indian Reservation, Washington, irrigable under Reclamation Act. Report made Jan. 18 by director on H. 10067 (same bill), introduced by Rep. Sherman of New York.
- S. 3000 (Sen. Carter)—Survey and disposition of certain lands on Milk River, Ft. Belknap Indian Reservation, Montana.
- S. 3005 (Sen. Ankeny)—Ratify and confirm agreement with Colville Indians, Washington, and making appropriation for carrying same into effect. (H. 11268.)
- S. 3687 (Sen. Hansbrough)—Segregation of \$1,000,000 from Reclamation Fund. (H. 13197.)
- H. R. 11796 (Rep. McKinlay)—For the diversion of water from the Sacramento River in California, for irrigation.
- H. R. 9748 (Rep. Wiley)—Purification of water supply in Washington.
- H. R. 149 (Rep. Van Duzer)—Appropriation for artesian wells in Nevada.
- H. R. 12221 (Rep. Brooks)—Authorizing Secretary of Agriculture to make experiments and investigations in utilizing limited water supplies in connection with farming in the semi-arid regions of the United States and making appropriation therefor.
- S. 1802 (Sen. Gamble)—Regulating public use of reservoir sites.
- S. 539 (Sen. Carter)—Restoration of lands in reservoir sites.
- S. 17 (Sen. Clark)—Printing of Reclamation Service Report.
- S. 2193 (Sen. Teller)—Public building for Geological Survey at Washington, D. C.
- S. 87 (Sen. Heyburn)—Withdrawal of townsites under reclamations projects.
- S. 91 (Sen. Heyburn)—Leaves of absence to homesteaders on lands to be irrigated (H. R. 5361).
- S. 276 (Sen. Fulton)—Purchase and condemnation of irrigable lands.

PUBLIC LANDS.

- H. R. 3019 (Rep. Lacey)—Repeal of Timber and Stone Act.
- H. R. 11268 (Rep. Jones)—Ratifying and confirming agreement with Colville Indians (S. 3005, Akeny).
- H. R. 10839 (Rep. Humphrey)—Relief of Desert Land Claimants for lands in Washington, entered between Jan. 1, 1902, and June 24, 1903 (S. 2710).
- H. R. 311 (Rep. Kinkaid)—Amending homestead laws as to certain public lands in Nebraska; providing for entry by homesteaders of public lands cornering on their homesteads up to 640 acres, when there are no public lands contiguous.
- H. R. 313 (Rep. Kinkaid)—Restoring homestead rights to those who entered a certain area in Nebraska between April 28 and June 28, 1904.
- H. R. 409 (Rep. Brooks)—Amending homestead laws as follows: That tracts of public lands up to 640 acres may be homesteaded in a described

- section of Colorado, or entered by homesteaders eligible to patent for less than 640 acres, provided that the Secretary of the Interior may exclude irrigable lands and lands which will support a family in tracts of 180 acres or less.
- H. R. 5361 (Rep. French)—Leaves of absence to homesteaders. See S. 91, reported on to Sec. Jan. 30.
- H. R. 6025 (Rep. Lacey)—Amendment of commutation provisions of homestead law.
- S. 2456 (Sen. Hansbrough)—Proofs in homestead and other claims to public lands and punishing false swearing therein.
- H. R. 8107 (Rep. Mondell)—Extending public land laws to certain Indian lands in Wyoming.
- H. R. 11268 (Rep. Jones)—Ratifying and confirming agreement with Colville Indians in Washington (S. 3005, Ankeny).
- S. 2101 (Sen. Gamble)—To permit second homestead entries.
- S. 311 (Sen. Gamble)—Regulating public land accounts between U. S. and the several States.
- S. 1031 (Sen. Perkins)—Five per cent to California of proceeds of sale of public land.
- S. 2292 (Sen. Fulton)—For the relief of entrymen and settlers within the Northern Pacific Railway's land grant between Wallula, Wash., and Portland, Oregon. Reported back with amendments (S. Report 351). Amended and passed Senate. Referred to House Com. on Public Lands.
- S. 2454 (Sen. Hansbrough)—Disposal of timber on public lands chiefly valuable for timber.
- H. R. 308 (Rep. Kinkaid)—Amendment to "An Act for the relief of settlers on public land (Sec. 2, Ch. 89, Sup. to R. S., Vol. I, 2d edition, p. 282). In place of Sec. 2 a section providing for notification by land officers to contestant when he has procured cancellation of any homestead entry or allotment of any Indian lands, thirty days to be allowed him to enter said lands; provided that the register be allowed a fee of \$1 for giving such notice, to be paid by contestant and not reported.
- H. R. 3133 (Rep. Burke)—Regulating public land accounts between U. S. and the several states (S. 311).
- H. R. 8440 (Rep. Lacey)—Granting 5 per cent of public land sales of Military Land Warrants to the public land states.
- H. R. 10067 (Rep. Jones)—Disposition of surplus and allotted Yakima Indian lands in Washington (S. 3005).
- H. R. 9719 (Rep. Lacey)—For relief of certain entrymen and settlers within limits of Northern Pacific Railway's land grant.
- H. R. 8439 (Rep. Martin)—Amending reclamation act to provide that when charges under projects are more than \$20 per acre the Secretary of the Interior may adjust annual instalments so that not over \$2 per acre need be paid each year.
- H. R. 10700 (Rep. Curtis)—Granting to railroads right of way through the public lands in Arizona, New Mexico, and Oklahoma, heretofore reserved for public buildings, etc.



LAND RECLAMATION BY DRAINAGE

Great Government Drainage Projects—Enlargement of the Old Homestead Idea—Nearly 100,000,000 Acres Can be Reclaimed

BY

GUY ELLIOTT MITCHELL

Secretary, The National Irrigation Association

ANOTHER striking plan to provide homes for industrious Americans of small means is contained in Representative Steenerson's bill now pending in Congress. This measure is really an extension of the old homestead idea, embodying also the main features of the National Irrigation Act, but in this case to be applied to the reclamation of our swamplands.

There are in the neighborhood of 100,000,000 acres of swamplands in the United States, some 70,000,000 of which have been surveyed, and the great bulk would make splendid farms if the excess of water were drained off.

The Steenerson bill provides for the beginning of the work of reclamation of these huge areas. The measure is framed after the irrigation law; it pro-



Courtesy State Entomologist of New Jersey

A New Jersey Drainage Ditch

vides that the receipts from the sales of public lands in the non-irrigation states shall constitute a "drainage" fund, to be expended by the government in great drainage works, and further, that the cost of such drainage shall be prorated among the lands benefited and paid back by the settlers into the "fund," to be used over again for additional reclamation work.

WOULD CREATE THOUSANDS OF HOMES.

This plan of developing the internal resources of the country and making

\$100 and \$150 an acre. Yet it is estimated by the government surveyors and engineers that the entire system could be effectively drained at a cost in the neighborhood of \$10 an acre. The same can be said of the lands of the Red River Valley in Minnesota. These include the finest grain and farm lands in the Northwest, except that they are frequently overflowed. It would be worth millions of dollars to the farmers and settlers who would occupy these lands in small tracts to



Minnesota Swamp Scene

homes of waste places is splendid in its scope, and appears to be entirely practicable and profitable. Take, for instance, the single example of the swamplands of the Kankakee River basin in Indiana and Illinois. Here are some 400,000 acres of the very richest of bottom lands, but subject to overflow. They are worthless except where they have been reclaimed through expensive private drainage works, when they have become worth

have a perfect system of drainage provided. These extensive systems, however, especially where they are interstate, seem to be feasible for handling only by the general government.

The Steenerson bill places the entire management of the work in the hands of the Reclamation Service, and the plan of operation follows very closely the irrigation work now being done by that branch of the Interior Department. Government lands, ceded Indi-



Scene in the Everglades of Florida



from U. S. Forest Service

Sentinel Cypresses of Lake Drummond in the Dismal Swamp of Virginia

an lands and private lands may be included in any drainage project, but in each case the cost of the drainage improvement is to be borne by the owner of the land, and no settler can have drainage provided for more than 160 acres, thus insuring the division of the tracts into small farms which must be actually settled upon and tilled.

DRAINAGE WORK ALREADY IN PROGRESS.

This work the Reclamation Service is qualified to do at this very moment. While primarily an engineering bu-

ject, is rich tule land covered by eight or ten feet of water, and is to be drained and converted into over a thousand farms. The topographic branch of the Geological Survey, of which the Reclamation Service is also a branch, has already run its lines over many of the great swamp areas of the eastern states and as soon as the Steenerson bill becomes a law the Geological Survey engineers will be ready to launch out into immediate activity in drainage projects.



Reclaimed Swamp Lands Produce Splendid Crops

reau, it has, in all its great irrigation projects, to deal directly with the farmer. It must outline a comprehensive drainage system for each irrigation project, since there is as much danger from too much irrigation as too little, and to do this the Service has its own farm and soil experts. Some of the irrigation projects have distinctively drainage features; in fact are almost as much drainage as they are irrigation projects. In the Klamath Project, 136,000 acres, or more than half of the area of the total pro-

WOULD START WITH A MILLION DOLLARS

The fund provided by the bill would be small as compared with the irrigation fund—it would approximate half a million dollars a year and would start off with about \$1,000,000, the receipts from the sales for the fiscal year 1905 being included; but on the other hand the cost of drainage would not be so great as that of irrigation.

The importance of this work of wholesale drainage, in order to provide homes for increased population, is

scarcely second in importance to the irrigation work. It means that tens of millions of acres of the most fertile land imaginable, which has lain idle for ages, may be converted from dismal and pestilential swamps and useless bogs into highly prosperous homes, to become the garden spots of the nation.

The Dutch have reclaimed vast areas in Holland from the encroachments of the ocean. Thousands of families live and farm below sea level, gaining their security by magnificent feats of engineering and persistence. They now contemplate the drainage of the Zuyder Zee, reclaiming some 1,350,000 additional acres of meadowland. American drainage in most cases would be far more simple and less expensive; it is simply a question as to whether the nation will see the wisdom of setting its hand to this work.

ANOTHER INLAND EMPIRE.

In Florida the everglades alone—almost solid muck beds—would afford an empire of some 7,000,000 acres; in New Jersey and Virginia are vast swamps, among them the famous Dis-

mal Swamp. In Illinois, which is generally regarded as a well-settled agricultural state, there are 4,000,000 acres of swampland; in Michigan there are nearly 6,000,000 acres. Fertile Iowa has about 2,000,000 acres of swampland. In Minnesota there are almost 5,000,000 acres of rich surveyed swamplands and huge swamp areas not yet surveyed. Arkansas has tremendous swamp areas which could be drained and made habitable, and in all there is a swamp area in the eastern half of the United States which is equal in extent to the great agricultural states of Indiana, Illinois and Iowa, with three or four smaller eastern states thrown in.

If the Steenerson bill demonstrates that the government can transform swamps into fertile farmland and that the settler or owner will pay back to the government the relatively small cost of the improvement, there seems to be no reason why this work of creation of value out of worthless waste should not go on indefinitely and provide homes for millions more of rural population.

THE FOREST SERVICE

History of a Month's Work in Government Forest Matters

Planting Work

In connection with the proposed development of the barren lands along their new line of railroad, the Nevada Northern Railway Company has made application to the Forest Service for assistance in establishing experimental forest plantations. These plantations will be made at each of the water tanks to determine what trees can be grown to advantage, and by what methods. The general aim is to encourage the settlement of the region by demonstrating that the lands are of agricultural value or will, at least, produce timber. Experimental planting is proposed along the eighty miles of

new road which will be completed next summer, most of it being located in Elko and White Pine counties, Nevada.

The Frick Coke Company, of Pennsylvania, which applied to the Forest Service for plans to utilize part of its land for growing forest trees, has just received a report with recommendations upon the project. The object of the company is twofold. First, to add to the sale value of coal lands now worthless for agriculture; and second, to raise for its own use trees suitable for mine props.

Among the lands acquired by the company in connection with the un-

derlying coal are some which are better adapted for tree growth than for raising other crops; other lands have sunk, owing to the removal of the coal, and are worthless except for tree growth. By planting such lands with forest trees they can be given a market value which they do not now possess.

It is proposed to plant about five hundred acres with chestnut, European larch, and other suitable species, from which mine props may be expected after about twenty years.

The Louisville and Nashville Railroad Company has requested the Forest Service to supervise the management of its catalpa plantations at El Dorado, Shawneetown, and McLeansboro, Ill. These lands were examined by a representative of the Forest Service last summer, and it was recommended that the young trees be cut back to the ground this winter. It is the desire of the railroad company to have these recommendations carried out under the expert supervision of the Service. Many of the plantations established by the railroads in the past have failed because of improper methods in planting, unwise choice of species, and lack of care after the trees were set out. The Forest Service is now in a position to co-operate with railroad companies in securing better results from plantations established, and in starting new ones.

The Forest Service has recently made an examination of the grounds of the U. S. Marine Sanatorium at Ft. Stanton, New Mexico, with a view of recommending forest planting. The prime object is to secure shelterbelts which will break the force of the strong winds of that region. A series of such shelterbelts will be planted next spring with coniferous trees furnished from the Forest Service nursery near Pasadena, southern California, and detailed plans are being prepared for additional work of this kind in future years.

The Mayor and Park Commission of Los Angeles have recently approved a plan whereby the city will appropriate \$500 to be used by the Forest

Service in establishing forest plantations in Griffith Park. A planting plan for this park was prepared by the Service in 1903, but as yet very little planting has been done. The present arrangement is for the city to contribute the necessary funds, and for the Service to execute the planting plan, using plant material from the government nursery in the San Gabriel Mountains, thirty miles from Los Angeles. This should secure the best of plant material and expert direction of the work, with the result that the 3,000 acres of denuded and brush land comprising Griffith Park will eventually be converted into a forest.

An application for a planting plan has been received from the Hillenbrand Company, of Batesville, Ind. It is a company dealing in hardwood lumber, piling, and cordwood, and they desire to secure the co-operation of the Forest Service in planting certain areas for timber supply and to serve as an object-lesson to the general public.

A bank in Luverne, Minn., has just applied to the Forest Service for a forest-planting plan, for the purpose of raising trees on some hundred acres of land owned by the bank, in order to secure a future income from the timber. About twenty acres of the tract is level, and the remainder rolling. The soil ranges from sandy to loamy. Trees which thrive in the neighborhood are poplar, birch, tamarack, and various evergreens. Red and white pine, Norway spruce, and European larch are considered desirable trees for planting on this land.

Last spring the Forest Service started a forest nursery at Fort Bayard, New Mexico, in order to secure trees for planting the watershed of Cameron Creek, which furnishes the water supply for the military post and hospital on the Ft. Bayard Military Reservation. The seed sown was mostly western yellow pine, of which there are now 450,000 seedlings. Four-fifths of these will be transplanted this spring to secure better root development. A limited amount of seed of the Torrey,

Coulter, and knobcone pine was sown, but this was damaged by the rabbits. Further experiment with these species will be made this spring, and incense cedar and Jeffrey pine will also be sown.

Experimental seed-spot planting of Mexican walnuts and acorns from the oaks native to the region was made last fall. Spring planting on seed spots will also be tried. Next spring the western yellow pine seedlings will be transplanted to their permanent situations, in open places on the watershed.

New Forest Reserves

The small group of reserves on the checker-board pattern, just south of Bozeman, Montana, known as the Gallatin Forest Reserves, has been recently merged into a much larger reserve, under the name of the Gallatin Forest Reserve, composed of a compact body of land, containing about 850,000 acres.

This new reserve, which entirely surrounds the former group, embraces the mountainous region bounded by the Gallatin Valley on the north, the Yellowstone and Madison Valleys on the east and west, and the Yellowstone Park and Madison Forest Reserve on the south.

The fact that this area is traversed, north and south, by the Gallatin Range, which sheds east and west into the Yellowstone and Gallatin Rivers, and the Madison Range, which drains, in like manner, into the Gallatin and Madison Rivers, make the region one of great importance in connection with the agricultural development of the valleys watered by those streams.

This is especially true as regards the Gallatin Valley, which is the most important irrigated valley in the state of Montana. While nothing can be raised in the valley proper without water, it already produces annually more than one-fourth of the cereals, and contains more than one-eighth of the total irrigated area of the state, and with a sufficient water supply this area can be doubled.

Approximately 90 per cent of the available water for the 112,000 acres of arable land in this valley comes from the tract embraced in this new reserve, while both the Yellowstone and Madison Valleys are also largely supplied by streams flowing from this region. In fact, the importance of protecting the watersheds within this reserve, upon which all three of these valleys depend, can not be overestimated.

The forests on these slopes, moreover, represent a timber supply for the railroads running through the treeless plains to the eastward, and also for the neighboring ranchers. While considerable lumber is shipped into this section, the supply of fence posts, rails, house logs, etc., must necessarily be obtained from the nearby mountains, and one of the chief objects of this reserve will be to perpetuate this supply. The demand for timber in the coal mines that have been discovered in the Gallatin Basin, on Taylor's Fork, also causes a heavy draft on the timber resources of this region.

The government will at once proceed to take efficient measure to protect and increase, as far as possible, the water, timber, grazing, and all other resources of this region. As fire is the greatest danger to be guarded against, a patrol force will be placed on the mountains to protect the timber from further injury from that cause. Danger from this source will be further reduced to a minimum by having necessary regulations thoroughly understood by all who enter the reserve, and effectively carried out by the reserve officers.

While all possible precautions will thus be taken to protect the forests, it should be understood that the cutting of timber by miners, settlers, lumber concerns, and others will not be prevented, but merely regulated; so that the conserving power of the watersheds will not be injured, and the young growth of timber will be so protected and aided that a continuous supply will be guaranteed for the use of the public in the future.

A small forest reserve has been established in Mesa county, Colorado, covering twelve sections of land, or 7,680 acres, in order to protect the headwaters of East Creek, from which the citizens of the town of Fruita, Colorado, desire to draw their water supply by constructing a pipe line more than twenty-four miles in length, at an estimated cost of \$75,000 for a continuous flow of one "second foot," a stream of one cubic foot per second.

The great outlay involved in this undertaking makes it imperative that a continuous supply of water shall be assured in advance. This can only be done by firmly protecting the wooded area at the headwaters of East Creek from fires and further inroads by lumbermen.

Promotions and Assign- ments

Mr. W. G. Weigle, of the Forest Service, has gone to Wisconsin to mark timber which the Office of Indian Affairs has sold under contract on Indian Reservations there.

Congress has empowered the Secretary of the Interior to dispose of timber on Indian Reservations in such way as is best for the Indians' welfare, and in order that such timber shall be cut in a manner to furnish the Indians the best business returns not only now but in the future, the Indian Office has asked the Forest Service to co-operate by marking the trees to be cut and supervising the logging.

The reservations on which Mr. Weigle will mark timber are the Flambeau and Bad River reservations.

William Hurst, of the Forest Service, formerly Assistant Forest Ranger on the Dixie Reserve, in Utah, has passed the recent supervisor's examination, and has been assigned to the position of Forest Supervisor of the Beaver Forest Reserve in the same state.

The Forest Service announces the promotion of two Forest Supervisors to the salary of \$1,400 per annum for high efficiency and on their record as supervisors. They are: J. R. Bell, Forest Supervisor of the San Jacinto

and Trabuco Canyon reserves, in southern California; and E. S. Morrissey, of the Wichita Forest Reserve, in Oklahoma.

Madison B. Elliott has been appointed Supervisor of the Tahoe and Yuba Forest Reserves, in California.

Dr. H. K. Porter, of Delta, Colo., has been appointed Forest Supervisor of the Uncompahgre Forest Reserve, in that state, and took charge February 21, with headquarters at Montrose.

Forest Superintendent D. B. Sheller has been placed in temporary charge of the Yuba Forest Reserve, in California, with headquarters at Nevada City, Cal.

Timber Test- ing and Preservation

Mr. C. G. Crawford, of the Forest Service, recently went to Pottsville, Pa., to inspect the work which is being conducted in co-operation with the Philadelphia and Reading Coal and Iron Co. to determine the advisability and the best method of treating with preservatives the timber in the company's mines. The investigation has so far progressed very satisfactorily, and the company has recently issued an order that all their mine props must be peeled, as recommended by the Forest Service, an order which will be strictly enforced by the company.

Loblolly pine is very extensively used in the mines of the company for mine props. This wood, when untreated, is subject to very rapid decay, so that timbers must frequently be renewed. Any means of reducing the frequency of necessary renewals would mean a large saving in timber. Even the addition of three months to the life of the props would render desirable such preliminary outlay as this would entail.

The timber testing station of the Forest Service at Lafayette, Ind., has begun a series of tests upon Norway pine and tamarack grown in Minnesota. The value of these woods for paving blocks and building material will be determined.

The timber testing station of the Forest Service at Berkeley, Cal., has begun an investigation of the mechanical properties of the eucalyptus. About 60 trees have been cut from different sites, and the uses of the wood for vehicles, paving blocks, etc., will be reported upon.

Basket Willow Experiments

The Forest Service is now harvesting its crop of basket willows at the Arlington experimental farm, near Washington, D. C. Some time ago the Service started a series of experiments to determine the relative value for basket manufacture of European varieties of willow and those which have been heretofore grown in this country, the effect of close and wide planting and of high and low cutting, the value of inundation in fertilizing and retarding the work of insects, and the quality of the shoots from each variety. The Service will distribute the cuttings to growers and to any other persons who may wish them. Directions for the planting and cultivation of the basket willow are given in a recently published bulletin of the Forest Service.

Box Manufacturing

Mr. J. P. Wentling, of the Forest Service, recently attended a meeting of the National Association of Box and Box Shook Manufacturers, at Chicago, before which he read a paper on the relation of box manufacture to the lumber industry. Though no accurate figures are at present to be had to show the statistical importance of box manufacture, estimates would indicate that a surprisingly large percentage of lumber goes into boxes. In the early days of the industry, when all sorts of usable woods were plentiful, there was no cause to study economy in box-making. Gradually, however, depletion of lumber supplies began to produce a scarcity in the more desirable box woods, such, for example, as white pine. This gave the incentive to study the strength of woods for boxes, and how saving might be effected in box construction. Search

for new box woods also followed, and led to experiments with hitherto untried kinds. At present economy is increasingly studied, and the Forest Service has made box woods the subject of one of its several studies of woods for special uses.

Commercial Tree Study

Among the commercial forest trees which the Forest Service has been studying is the white fir. This has generally been regarded as the least valuable of the conifers common to the commercial forests of the Western Sierras. Yet it attains large dimensions and is capable of taking a fine, satiny finish, and the best grade of lumber has been considerably used and commands a good price in southern California especially. The Service has now completed the gathering of data for volume and growth tables, and a study of the silvical character of the tree. In connection with this, a market study was also made for the whole of California, with special reference to its possible uses, cost of manufacture and technical qualities.

Examining Southern Lands

A preliminary examination has been started on a tract of 50,000 acres in South Carolina, which the owners have requested the Forest Service to examine, with a view to placing it under conservative forest management. This tract is the fourth for which a working plan has been sought from the Forest Service by forest owners in this state, the total acreage of the four tracts being upward of 135,000 acres.

The Forest Service has just completed a preliminary examination of a large timber tract on the west coast of Florida. The tract in question is on low, sandy land, cut up by numerous creeks and cypress swamps. On the drier land Cuban pine is the principal tree, but, as these dry lands are apt to be flooded yearly during the rainy season, the growth of this tree has been badly stunted, and the chief problem brought out by the examination was whether drainage on a large scale

would sufficiently improve the tree growth to warrant the expense. This question has additional importance in view of the large amount of land of this character lying along the west Florida coast and extending well back into the interior of the state.

Co-operative State Work

A plan has recently been approved for co-operative forest experiments between the Forest Service and the University of Nebraska. The university is to donate twenty-five acres of land at the North Platte substation, and systematic experimental planting is to be carried on under the supervision of the Forest Service. The aim is to increase the knowledge of forest planting in western Nebraska, laying especial emphasis on the valuable new species, the general relation of species to soil and climate, spacing, mixtures,

cultivation, etc. The work will run through a period of years and only small lots will be planted annually.

An estimate of the timber growing on what is known as the "north grove" of the Calaveras Big Tree Grove, in California, has just been completed by the Forest Service. The area covered by the big trees is about one hundred acres. The entire north grove comprises 640 acres. This work forms part of the co-operative forest studies which the Service has undertaken at the request of the state of California. There is an earnest and widespread desire to save the Calaveras grove from such a sale as would result in its destruction. The owner is willing to dispose of it, and an accurate and satisfactory appraisal of the value of the timber should help to an agreement on a fair price if Congress sees fit to purchase it.

THE YUMA RECLAMATION PROJECT

One of the Largest of the Many Irrigation Works
Undertaken by the Government—Similar to Nile Projects

ASPECIAL interest attaches to the Yuma reclamation project in Arizona and California, one of the great national irrigation works now well started, by reason of the unusual physical conditions of that section of the Southwest, and the somewhat unique engineering problems which are involved.

Physically and climatically the Colorado Delta is singularly like that of the Nile. Like the great river of Egypt, the Colorado rises in far-distant mountains and empties through great tidal flats into an inland sea, its valley and climate all bearing out the likeness. The Colorado is one of the great rivers of the arid West. It drains an area of more than 225,000 square miles and pours a turbid flood

into the Gulf of California for hundreds of miles. It has cut its channel more than a mile deep through the plateaus, carving out abyssal canyons which are the most wonderful in the world. In flood its waters carry in solution millions of tons of silt and detritus which for ages the stream has deposited in the sea building up a broad delta through which it flows on top of a dyke so that its normal channel is elevated considerably above the country on either side. In time of flood it spills over its dyke inundating a portion of its valley.

The engineering works involve a dam across the river, canals on both sides of the stream, and an extensive system of levees to protect the lower lands from flooding. The dam known

as the Laguna is being constructed about twelve miles above Yuma by a New York contractor, and is notable as being the first of its type built in America. The diamond drillers sought in vain for bed rock formation in the channel and finally the government decided upon a structure of the East India weir type patterned after the dams built under similar conditions in India and Egypt by the English engineers.

The Laguna dam will be 4,780 feet long, 19 feet high, with a maximum

Unprecedented floods during the past year have emphasized the importance of safe-guarding the construction of the levees which are required to prevent inundation of valuable lowland areas. The problem is complicated because of the fact that the area to be irrigated is in the drainage basin of two important streams, the Gila and Colorado Rivers, both subject to sudden and tremendous floods.

The main canal of the project will cross the valley of the Gila in a pres-



Scene in the Valley of the Lower Colorado River Below Yuma Dam Site

width of 267 feet and will contain 356,000 cubic yards of loose rock. It will rest on a foundation of sand and will weigh approximately 600,000 tons. The settling basin formed by this structure will be one mile wide and ten miles long. To avoid the enormous quantities of silt carried by the Colorado and which would quickly fill up the canals, the headgates are so arranged as to draw off only the top foot of water into the canals.

sure pipe passing under the stream. The Gila is normally dry or nearly so, but when in violent flood, frequently changes its course so that the levees must be placed so as to confine the stream to a definite channel before building the crossing as it might otherwise change its course and leave the crossing to one side. The crossing must be made during the coming winter and the dykes must be built in the spring and summer.



THE RECLAMATION SERVICE

Progress of National Irrigation During the Past Thirty Days

Garden City Project

Plans and specifications for the machinery for the Garden City Project in western Kansas were approved by a board of engineers which met at Garden City, Kan., recently. Bids will be opened at Chicago on May 28.

This irrigation project is not one of the large enterprises which the Reclamation Service is developing. It is, however, attracting considerable attention on account of the numerous novel features involved in its construction. The water for this project must be recovered from the underflow waters of the Arkansas valley, which lie in gravel deposits existing below the bed of the river. It is therefore necessary to sink several hundred wells, from which the water will be pumped and discharged into a collecting conduit. The wells are scattered along the line nearly five miles long. The power is generated at a single central plant situated on the railroad and then is distributed by electricity to the wells.

This is the first reclamation project to be authorized in which it is necessary to pump the water, and is the only project in which the water must be recovered from wells and not from a flowing surface stream of water. On this account much interest is taken in the project by settlers in western Kansas and Nebraska. They believe that the demonstration to be made will be of value to many other communities situated similarly to that at Garden City.

Applications for water under this project have been made by the owners of more than 12,000 acres of land to be benefited, and the community is very enthusiastic concerning the future success of irrigation in the Arkansas valley. Very large crops of wheat can be grown on the lands under the project if a small amount of water is

available in the fall and spring to insure the starting of the seed. Garden City has long been famous as an alfalfa center. This location seems to be especially well adapted to the maturing of the seed crop of alfalfa which has always paid well here. A sugar factory is being constructed at Garden City where those who desire to raise sugar beets will find a market for their crop.

Appointments and Assignments

Mr. J. C. Stevens, hydrographer at Washington, D. C., has been ordered to report to Supervising Engineer D. C. Henry, Portland, Ore., to take charge of the hydrographic work of the Geological Survey in the states of Oregon and Washington, with headquarters at Portland. The growing demand for more complete and accurate data concerning the flow of streams in Oregon and Washington has made necessary the selection of a hydrographic expert who is familiar with the methods of the division of hydrography. Mr. Stevens has shown technical and executive ability in the performance of his duties during the last three years in the Washington office.

Mr. Wilbur H. Fisher, engineering aid of the Reclamation Service, who has been on furlough, due to lack of work on account of climatic conditions in the West, has been assigned to duty at Cody, Wyo. Mr. Fisher while absent from the Service has been employed by one of the large cement-manufacturing companies of California, where he has gained valuable experience in this line of work.

Mr. C. E. Slonaker, observer, and Mr. Ernest R. Childs, assistant engineer, of the Reclamation Service, have been transferred to Portland, Ore., for field duty.

Mr. Carrol Paul, engineering aid of the Reclamation Service, who has been

on furlough on account of lack of work, due to climatic conditions, has been reassigned to duty at Wyncote, Wyo., for work in connection with the Interstate canal.

Mr. W. S. Kanna, engineering aide in the Reclamation Service, has been transferred from the Washington office, where he has been employed in the drafting division, to field duty at Chinook, Mont., in connection with the Milk River Project.

Mr. Clinton R. Thompson was recently appointed topographic draftsman in the Reclamation Service and ordered to report to Mr. John E. Field, district engineer, at Mitchell, Neb.

Mr. A. H. Perkins, engineer, United States Reclamation Service, was recently transferred from the Washington office to duty at Cody, Wyo., on the Shoshone Project. Mr. Perkins is a graduate of the civil engineering course, Cornell University, 1894, and was transferred to the Reclamation Service from the Bureau of Engineering in the Philippine service.

Contract Suspended

The Secretary of the Interior has suspended the operation of the contract of July 21, 1905, with Callahan Brothers, and Phelan and Shirley, of Omaha, Nebraska, for divisions 2, 3, and 4 for main canal, Fort Buford Project, North Dakota and Montana.

The suspension is made under provisions of paragraph No. 21 of the specifications, which provides that upon failure of the contractor to perform the work in accordance with the specifications the Secretary may suspend the contract and take possession of the machinery, tools, appliances, etc., of the contractor and make arrangements to complete the work.

Repairing of Pecos System

The Secretary of the Interior has authorized that the repair and reconstruction of the Pecos irrigation system at Carlsbad, New Mexico, be done by the Reclamation Service under force account and not by contract. This authority was granted to obviate the delay always incident to advertis-

ing for bids and because of the fact that the works must be completed at the earliest possible moment in order to save the crops on 10,000 acres of land in that section. A large portion of this area is in orchards and if deprived of water the orchards would be ruined, entailing a loss of property valued at hundreds of thousands of dollars.

Contracts Let

The Secretary of the Interior has approved the contract executed by the President and attested by the Secretary of the Strawberry Valley Water Users' Association, Utah, guaranteeing repayment to the United States of the cost of the irrigation works which may be constructed thereby in connection with the Strawberry Valley Project, Utah. Authority has been given the Reclamation Service to prepare plans and specifications for the work and to submit them to the department.

The Secretary of the Interior has also executed a contract on behalf of the United States and approved the bond of the International Contract Company, providing for the construction work of schedule 4, main canal, Klamath Project, California-Oregon. This contract calls for the construction of five highway bridges at \$1,158 each, with 85-foot Howe truss, spans, superstructures, complete in place, and one bridge, 80-foot Howe truss, spans, and superstructures, at \$1,055. He has also approved the bond and executed contract on behalf of the United States with Messrs. Hughes and Olsen, providing for the construction and completion of division one, of main canal, Huntley Project.

A contract has been let to Mason, Davis & Co., of Portland, Oregon, for the construction of schedules 1, 2, and 3, main canal, Klamath Project, California-Oregon. This contract calls for the construction of about 9 miles of main canal, near Klamath Falls, Oregon, with headworks, sluice gates, bridges, and other appurtenances involving about 600,000 cubic yards of excavation, 3,100 linear feet of con-

crete lined tunnel, and 4,000 cubic yards of concrete masonry, exclusive of tunnel lining. The bid of Mason, Davis & Co. was \$377,330.

A contract has been awarded to the McFee and McGinnity Company, of Denver, Colo., for 30,000 barrels of Portland cement for the Uncompahgre Valley Project, Colorado. The bid of the contractors is \$1.45 per barrel f. o. b. cars at Iola, Kansas.

The Secretary of the Interior has awarded to the Western Portland Cement Company, of Yankton, South Dakota, the lowest bidder, the contract for furnishing from 20,000 to 30,000 barrels of Portland cement for the Belle Fourche Project, South Dakota. The bid of this company was \$2.43 per barrel f. o. b. cars at Belle Fourche, South Dakota.

There is a demand for from 8,000 to 12,500 barrels of Portland cement for use in the construction of the Lower Yellowstone Project, Montana-North Dakota, and bids will be received by the project engineer, U. S. Reclamation Service, Glendive, Montana, until April 12, 1906.

Bids are being asked for the construction of about twenty miles of main canal involving the excavation of 975,000 cubic yards of earth, and 10,000 cubic yards of solid rock, in connection with the Payette-Boise Project, Idaho. Also for the construction of a dam in Pecos River, involving the placing of 75,000 cubic yards of earth, 40,000 cubic yards of rock fill, 12,000 linear feet of steel sheet piling, 3,300 cubic yards of rubble concrete, and the furnishing and placing of about 219,000 pounds of steel, in connection with the Carlsbad Project, New Mexico.

The construction of about 145 miles of irrigation ditches involving 600,000 cubic yards of excavation with structures and bridges in Carson Sink Valley, Nevada, is ready for bids.

Bids are being asked for by the Secretary of the Interior for the construction of structures on main canal and laterals of the Lower Yellowstone Pro-

ject, Montana and North Dakota, to be opened April 12, 1906.

Land Withdrawals

The Secretary of the Interior has finally withdrawn the following described lands in the State of Oregon, for use in connection with the Cold Springs reservoir, Umatilla irrigation project:

WILLAMETTE MERIDIAN.

T. 5 N., R. 29 E., Sec. 34, SE $\frac{1}{4}$ NE $\frac{1}{4}$, SE $\frac{1}{4}$ SW $\frac{1}{4}$.

T. 5 N., R. 29 E., Sec. 34, SE $\frac{1}{4}$ NE $\frac{1}{4}$.

T. 5 N., R. 29 E., Sec. 36, NE $\frac{1}{4}$ SE $\frac{1}{4}$.

T. 4 N., R. 29 E., Sec. 1, E $\frac{1}{2}$ NW $\frac{1}{4}$, NW $\frac{1}{4}$ NE $\frac{1}{4}$.

T. 4 N., R. 29 E., Sec. 3, NW $\frac{1}{4}$ NW $\frac{1}{4}$, SE $\frac{1}{4}$ SW $\frac{1}{4}$.

T. 5 N., R. 30 E., Sec. 31, N $\frac{1}{2}$ SW $\frac{1}{4}$, N $\frac{1}{2}$ SE $\frac{1}{4}$.

These lands were temporarily withdrawn on August 16, 1905, for examination and survey, and their use has been found necessary for reservoir purposes. The Secretary has directed the Commissioner of the General Land Office to notify all persons who have made entry of such lands prior to the preliminary withdrawal and who have not acquired a vested right thereto, that said lands have been appropriated for irrigation purposes and that their entries will be cancelled and their improvements paid for by the government, unless sufficient cause is shown within sixty days from date of such notice.

The Secretary of the Interior has temporarily withdrawn from any form of disposition whatever under the public land laws the following described lands in the State of Idaho, for use in connection with the Flat Rock reservoir site, Payette-Boise irrigation project: T. 14 N., R. 43 E., Secs. 1, 2, 11, 12, 13, 14, 23, 24, and N $\frac{1}{2}$ Sec. 25, and N $\frac{1}{2}$ Sec. 26, or 5,760 acres.

He has also temporarily withdrawn the following described lands in the state of Colorado, for use in connection with the Taylor Park reservoir,

Uncompahgre Valley Project: 6th P. M. Section 24, T. 14 S., R. 83 W.

**Kansas
Pumping
Project** Secretary Hitchcock has executed a contract on behalf of the United States with the Finney County Water Users' Association, whereby the association guarantees to repay to the United States the cost of the irrigation works which may be constructed in connection with the Garden City Project, Kansas.

This project contemplates the recovery of ground water in the Arkansas Valley by means of pumping, and its distribution over about 10,000 acres by the use of an existing canal known as The Farmers' Ditch. The proposed pumping plant involves the construction of 23 separate pumping stations, each driven electrically from the central power station located on the main line of the Atchison, Topeka & Santa Fe Railroad.

The annual rainfall in this part of the Arkansas Valley is about 20 inches, the larger part of which falls during the summer months. This portion of the high plains is peculiar in that there is an almost complete absence of runoff, practically all of the rain-fall sinking into the ground. An investigation of conditions was begun in 1904 by Prof. Charles S. Slichter, of the U. S. Reclamation Service, and a project of sufficient promise to warrant detailed study was then outlined.

The value of land in this part of Kansas in its natural condition is from \$5 to \$10 per acre. When reclaimed by irrigation it is easily worth from \$100 to \$150. The soil is similar to that in the well known wheat belt of Kansas, very fine grained and fertile, requiring the application of only a small amount of water for irrigation. The principal crops suitable for these lands are sugar beets and alfalfa, considerable quantities of which are already under cultivation. Sugar beets are already located at points within easy shipping distance from Garden City. Back of the lands to be watered

are wide strips of excellent grazing lands which will grow cane and forage plants without irrigation.

The western portion of Kansas appears to be underlaid with inexhaustible quantities of underground water at no great depth, and the successful initiation of a government pumping system will undoubtedly encourage private capital to take up the work in other sections.

**Payette-
Boise
Project** The Secretary of the Interior has awarded the following contracts for certain schedules for the construction of dam, canal, and embankments in connection with the Payette-Boise Project, Idaho.

Schedule No. 1, for the dam and diverting works on the Boise River, \$158,950, to the Utah Fire Proofing Company, Salt Lake City, Utah. This contract calls for 15,000 cubic yards concrete masonry, 5,000 cubic yards concrete, 10,000 pounds of steel for reinforcing, 325,000 feet B. M. common lumber, 20,000 pounds drift bolts, 2,500 cubic yards fill in crib work, 14,000 cubic yards wet excavation, 12,000 cubic yards dry excavation, and 1,000 cubic yards of rip rap.

Schedule No. 3, for the main canal from Indian Creek to Deer Flat reservoir, to Conway and Wilhite, Star, Idaho, \$95,400. The requirements of this contract are for 414,800 cubic yards of excavation.

Schedule No. 4, for structures on canal from Boise River to Deer Flat reservoir, including bridge structures, turn-outs, culverts and drops and diverting works from Indian Creek, \$48,855, to Page & Brinton, Salt Lake City, Utah.

Schedule No. 3, for lower Deer Flat embankment and diverting works, \$256,550, to Hubbard & Carlson, Boise, Idaho. This schedule includes 950,000 cubic yards of material for embankment, 50,000 cubic yards of excavation in foundation, 1,500 cubic yards of concrete, and 20,000 pounds

of steel for reinforcing and in bridge and canopy.

The Secretary of the Interior has directed that there be a new advertisement for the work of schedule No. 2, the main south side canal from Boise

River to Indian Creek, and also authorizes the Reclamation Service to complete the work of schedule No. 5, the Upper Deer Flat embankment and diverting works, by force account under the supervision of the engineers of the Reclamation Service.

THE BLACK MESA FOREST RESERVE

BY

F. S. BREEN

Supervisor, Black Mesa Forest Reserve

THE Black Mesa Forest Reserve of Arizona was created by executive proclamation August 17, 1898, and contains 1,658,880 acres, or 2,786 square miles, covering the Mogollon mountain range from a point north of Camp Verde southwest to the New Mexico territorial boundary.

The main south boundary line is marked mainly by what is locally termed the "rim," an abrupt cliff or wall of rock that leaves a sheer, precipitous descent of from 1,000 to 1,500 feet for a distance of over 250 miles, with but three places where it is possible to ascend with teams, although there are two or three trails that may be used with pack horses.

The reserve includes part of Cocino, Yavapai, Gila, Navajo, Apache and Graham Counties, and is located in the wildest and most broken part of the territory with very few settlements within its borders. The nearest railroad points are Flagstaff and Holbrook on the Santa Fe Railroad, both points being from sixty to seventy miles north by wagon roads.

The north boundary line of the Apache Indian reservation closes on the south boundary line of the forest reserve for a distance of over 200 miles, cutting off something in the neighborhood of a million acres of the best timbered area in Arizona, mainly unused, where large forest fires are numerous each spring, and come

sweeping to the north onto the forest reserve.

Recent examinations by the Forest Service were made for the purpose of including additional timbered areas both west and east of the Apache Indian reservation, in this reserve, though no official action has been taken up to date.

There are eight small settlements within the reserve, with population ranging from twenty to one hundred people, the Mormon sect predominating in each. These settlements were made during the early history of Arizona by pioneer bands of Mormons moving down from Utah by wagon trains over hundreds of miles of desert land and who located on small streams or at natural springs, making a precarious livelihood by cultivating small patches of alluvial soil. During 1904 a number of these settlements were practically abandoned because of drought for a succession of years.

Along the western border of the reserve are several points of scenic interest. The Montezuma Castle, a historic cliff dwelling built in the angle of the cliffs two hundred feet from the ground, of stone and adobe, which in itself is four stories high containing many rooms and on top a breastworks with portholes commanding the upper angles of the cliffs on both sides; the Montezuma Well, a natural phenomenon, covering an acre or more filled

with pure spring water, the bottom of which has not as yet been fathomed. The side walls of this well go down about eighty feet before water is reached, and small cliff dwellings are found just above water level. A short distance up Clear Creek from this point is the "Soda Spring," a spring of cold water tasting strongly of carbonic acid gas boiling up out of the ground in which it is impossible for a person to sink.

difficult to utilize on account of the scarcity of water for stock purposes, let alone irrigation.

Stock is mainly the means of making a living both inside the reserve and adjacent to it. When the reserve was first created there were 225,000 head of sheep and about 40,000 head of cattle grazed upon during the greater part of the year. The number of stock has been gradually reduced from year to



Large Growth of Alligator Juniper in the Black Mesa Forest Reserve

To the south four miles is the "Natural Bridge," the largest natural bridge in the United States; articles placed in the water running underneath the bridge are rock-covered within a week. These points of interest are so far off the line of travel that they are not very well known except locally.

There is very little agricultural land on the reserve and that little is very

year until at present there are 115,000 head of sheep and 30,500 head of cattle and horses grazed under permit.

The sheep grazing permits are for the grazing season commencing April 1st and closing December 1st each year; there is no regular grazing season for cattle and horses, but during the winter months the greater part of the stock necessarily drifts off the reserve to the lower levels.



Grove of Aspen in the Black Mesa Forest Reserve

Over half the sheep grazed on the reserve are taken south via the Heber Sheep Trail to Salt River Valley

where they are sheared, returning to the reserve by the same route usually in May.



Yellow Pine in the Black Mesa Forest Reserve

The regulation of sheep grazing has resulted very beneficially to the reserve as well as to the stock owners, by the elimination of many bands that were owned by transient sheepmen who neither owned land or water, leaving the range for the permanent stockmen, who now appreciate the protection afforded them in giving each sheep owner entitled to range, an exclusive range for his sheep.

At first stockmen and settlers who had for years utilized the reserve with-

out restrictions, resented the interference of the government, but gradually this feeling has been eradicated and the better element realize even the immediate benefits of the restrictions imposed. During the past year these stockmen gave substantial evidence of their appreciation of the reserve by assisting at forest fires from April to the middle of July, an almost continuous service night and day for the stockmen

of one district or another, saving the Government several thousands of dollars that otherwise would have had to have been paid for assistance, aside from the incalculable damage to young growing timber.

Aside from the benefits derived from grazing, the people in general are commencing to more fully realize the fact that in reserving this large body of timber, it has been reserved for their use, instead of permitting it eventually to fall into the hands of



Green Mountains from Mt. Baldwin

speculators through fraudulent homesteads, thus preventing the small local saw mills from purchasing timber as it is required by the settler for the development of his claims, inside or outside the reserve, as has been done in other States.

Over 90 per cent of the reserve is covered with a good stand of yellow pine, running from 2,000 to as high as 6,000 feet per acre, much of which at

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Over 90 per cent of the reserve is covered with a good stand of yellow pine, running from 2,000 to as high as 6,000 feet per acre, much of which at

present is too far removed from a market, but in a short time much of this belt will be reached by railroads for which surveys are now being made.

The great length of this reserve, covering as it does, the heart of the most inaccessible part of the territory, the greater part totally uninhabited, makes the management of the reserve very difficult. The Rangers' districts are extremely large amounting to as high as fifteen or sixteen townships. While there is only a small amount of business for them to handle aside from

fires, it is scattered over such an expanse of country that it takes hard work, and a complete camp outfit to successfully see to it.

The new rules issued by the Forest Service, taking effect July 1st, last, have not become generally known among the settlers, but when they are, a much more favorable opinion will be conceived by them of the reserve by reason of the very liberal policy outlined, in which many of the former technicalities have been eliminated.

SUCCESSFUL FIRE PROTECTION IN CALIFORNIA

Private Owner Has Built Fire Lines and Inaugurated Patrol System to Guard Young Growth

AN item of news of wide importance to timberland owners is the announcement that a California lumber company, which applied a plan of fire protection to a single township during the summer of 1905, is now preparing to extend the same protection to the rest of its large holdings of cut-over land.

Except in the national forests, but little attempt has as yet been made to protect from fire the forests or cut-over lands of the Pacific coast. In California, it is true, the state forester has taken up fire protection as one of the most pressing problems of his administration. But in Oregon and Washington particularly, and on private holdings in California, fires are so destructive that little hope is cherished by owners of securing crops on cut-over land before fires have prevented or destroyed them. The severe losses which have come from these fires have, however, made a deep impression upon lumbermen. Where timberlands are owned, too often the investor must be contented with the profits of his first lumbering operations, since, despite the excellent natural reproduction which would, under

better conditions, restore the lands to forest, fire is almost certain to burn over, killing seedlings, scorching larger growth, and so deferring future crops indefinitely.

In the summer of 1904 the McCloud River Lumber Company, of McCloud, Cal., appreciating the seriousness of the fire losses common to lumbering operations in the region, agreed to attempt to protect its land according to the advice of the Forest Service, provided the plan of fire protection could be shown to be practicable and not too costly. The area chosen for the plan was cut-over land, a township in extent, on which the amount and character of the young timber was, as is commonly the case, sufficient to warrant expending something to guard it until it should establish a renewed forest.

Last summer the plan was put in operation. It called for clearing and burning broad fire lines from 200 to 300 feet in width, to serve as base lines from which to fight possible fires; organizing a patrol; locating tool houses for the storage of fire-fighting tools; erecting telephone lines to summon aid; and other similar measures. In making the fire lines, the old logging

trams were followed as far as possible. Twenty miles of lines were cleared.

During the dry season of 1905 the operation of this plan proved so successful that the company took steps to extend the protection to the rest of its holdings—from three to four hundred thousand acres—and may now apply to the Forest Service for another plan to cover an additional 20,000 acres recently purchased in southern Oregon.

The holdings of the McCloud River Lumber Company are in a region

where the danger from fire is unusually great, since the long dry season and the abundance of slash and chaparral not only make the starting of fires very probable, but also render their control difficult in a high degree.

One of the most important and significant points in connection with this use of a fire-protection system by a private owner is the fact that it means the recognition of the future value of young timber—proof that forestry has made rapid strides in California.

RECENT PUBLICATIONS

A Handbook of the Trees of California.

By Alice Eastwood. Occasional Papers of the California Academy of Sciences IX. San Francisco, 1905; 86 pp.

We are very glad to welcome Miss Alice Eastwood's "A Handbook of the Trees of California," which is published by the California Academy of Sciences (1905). Until the recent appearance of Prof. C. S. Sargent's "Silva," students of California trees have had to depend mainly on Brewer & Watson's Botany of California. Following this, Dr. Albert Kellogg's "Illustrations of West American Oaks," and Prof. J. G. Lemmon's "West American Conebearers," were excellent for the groups they covered. Miss Eastwood's book covers the whole field and presents, in mostly popular language, carefully drawn descriptions of 169 species and varieties. Fifty-seven of these are illustrated by half-tones and photoengravings which are clear, exceedingly helpful, and a most commendable and essential feature of the book, whether it be used by laymen or experts. In its range the work is more than it pretends to be, as it describes not only the trees of California but also the principal ones of Washington, Oregon, Arizona, Nevada, and Idaho. One new species of oak, *Quercus alvordiana*, is described for the first time. The conventional line between a number of so-called shrubs and trees has been passed by admitting as trees twelve shrubs not previously recognized as trees. Miss Eastwood studies trees and other plants in the field, as well as in the herbarium, and we are glad that she had rated some of these formerly neglected species as trees; notably *Narrya elliptica*, *Cercis occidentalis*, three manzanitas (*Arctostaphylos*) and several species of *Ceanothus*,

which we think should be considered trees. An important feature of this book is its three artificial keys to the trees described based on leaves, fruit, and on a combination of flowers, foliage, and fruit. The latter appeals to the trained botanist, while the first two can be used readily by laymen. The author has, we think, wisely excluded from her concise, clear, and helpful work, reference to mooted points in nomenclature, in which there is opportunity for discussion. We are glad to see even the preoccupied name *Sequoia gigantea* still used for California's greatest tree wonder, the Sierra Big-Tree, in place of the proposed *Sequoia wellingtonia*—which most Californians resent. Geo. B. S.

Proceedings of the Society of American Foresters. Vol. I, No. 1, pp. 28. Washington, D. C., 1905. Price 25 cents.

Proceedings of the Society of American Foresters. Vol. I, No. 2, pp. 108. Washington, D. C., 1905. Price 25 cents.

These two handsomely printed pamphlets mark the beginning of a series of publications that will be of much value to technical foresters. The Society of American Foresters was organized November 30, 1900, and has its headquarters in Washington, where the large majority of the trained foresters of the country are stationed through their connection with the government. The Society holds weekly meetings during about eight months of the year. At these meetings papers on forestry and related subjects are presented and discussed. It is the purpose of the Society to put these papers into permanent form which explains the numbers at hand.

Paper No. 1 contains an address on "Forestry and Foresters," by President

Roosevelt, delivered before the Society on March 26, 1903. It also contains the text of the Society's constitution, and a full list of members.

Paper No. 2 contains eight technical papers as follows: "The Reclamation Law and Its Relation to Forestry," by F. H. Newell; "The Application and Possibilities of the Federal Forest Reserve Policy," Edward T. Allen; "The Disposal of the Public Lands," George W. Woodruff; "Silviculture Applied to Virgin Forest Conditions," Alfred Gaskill; "Objections to the Forest Reserves in Northern California," Alfred F. Potter; "The Great Kansas River Flood of 1903," George L. Clothier; "The Necessity for Saving the Forests on the Watershed of the Sacramento River," J. B. Lippincott; "Results of a Rocky Mountain Forest Fire Studied Fifty Years After Its Occurrence," W. J. Gardner.

Forest Park Reservation Commission of New Jersey. First Annual Report. For the year ending October 31, 1905; Trenton, N. J., pp. 27. Illustrated.

Although the law for the establishment of forest reservations in New Jersey was only passed in March, 1905, the commission in charge of its execution has been actively at work. The report presented contains the text of the law under which they are operating, an administrative report covering their work from March to October inclusive and a chapter on forest fires. While New Jersey should have begun this work many years ago, it is encouraging to see the present activity.

Eleventh Annual Report of the Commissioner of Public Roads of New Jersey. For year ending October 31, 1904. Trenton, N. J., pp. 220. Illustrated.

Here again we have an excellent example of what may be done to improve public highways and thereby promote the upbuilding of a state's general welfare. New Jersey has taken the lead in the good roads movement, and these annual reports of its commissioner contain a splendid object-lesson to other communities.

Publications Received.

Entomological Society of Ontario; 36th annual report, 1905, pp. 143. Illustrated. Published by the Ontario Department of Agriculture, Toronto.

The Irrigation System of Ontario, California—Its Development and Cost. By F. E. Trask. Reprint from Transactions of American Society of Civil Engineers. Pp. 173-184. Illustrated.

The Municipal Water-Softening Plant at Oberlin, Ohio. By W. B. Gerrish. Reprint from Journal of New England Water Works Association. Pp. 421-436. Illustrated.

State Forest Administration in South Australia. Annual Progress Report for the year 1904-5. By Walter Gill, Conservator of Forests, Adelaide, 1905. Illustrated.

Forestry Quarterly, Volume IV, No. 1. Pp. 78. Ithaca, N. Y.

Bulletin of the New York Botanical Garden, Volume V, No. 15, containing annual report of officers for 1904.

The Indian Forester for January, 1906. Allahabad.

DEPARTMENT OF THE INTERIOR, Washington, D. C., March 5, 1906. Proposals will be received at the office of the United States Reclamation Service, Boise, Idaho, until 2 o'clock p. m., April 16, 1906, for the construction of about 20 miles of main canal, involving the excavation of 975,000 cubic yards of earth and 10,000 cubic yards of solid rock, in connection with the Payette-Boise Project, Idaho. Particulars may be obtained from the Chief Engineer of the Reclamation Service, Washington, D. C., or the Supervising Engineer, Boise, Idaho. E. A. HITCHCOCK, Secretary.

DEPARTMENT OF THE INTERIOR, Washington, D. C., March 9, 1906. Proposals will be received at the office of the United States Reclamation Service, Glendive, Mont., until 10 o'clock a. m., April 12, 1906, for the construction of about 26½ miles of canal near Glendive, Mont., involving the excavation of approximately 2,662,900 cubic yards of earth and 1,200 cubic yards of rock, and furnishing such material and doing such other work as may be necessary for the completion of the work. Particulars may be obtained by application to the Chief Engineer, U. S. Reclamation Service, Washington, D. C., or to the Engineer, Glendive, Mont. E. A. HITCHCOCK, Secretary.

DEPARTMENT OF THE INTERIOR, Washington, D. C., March 9, 1906. Proposals will be received at the office of the U. S. Reclamation Service at Laszen, Nev., until 10 o'clock a. m., April 19, 1906, for the construction of about 14½ miles of irrigation ditches, involving about 600,000 cubic yards of excavation, with structures and bridges, in Carson Sink Valley, Nevada. Particulars may be obtained from the Chief Engineer of the Reclamation Service, Washington, D. C., or the Supervising Engineer, Hazen, Nev. E. A. HITCHCOCK, Secretary.

DEPARTMENT OF THE INTERIOR, Washington, D. C., March 1, 1906. Sealed proposals will be received at the office of the United States Reclamation Service, Carlsbad, N. M., until 2 o'clock p. m., April 12, 1906, for the construction of a dam in Pecos River, involving the placing of 75,000 cubic yards of earth, 40,000 cubic yards of rock fill, 12,000 linear feet of steel sheet piling, 3,300 cubic yards of rubble concrete, and the furnishing and placing of about 210,000 pounds of steel, in connection with the Carlsbad Project, New Mexico. Specifications, forms of proposal and plans may be obtained from the Chief Engineer of the Reclamation Service, Washington, D. C., or from the Supervising Engineer, Carlsbad, N. M. E. A. HITCHCOCK, Secretary.

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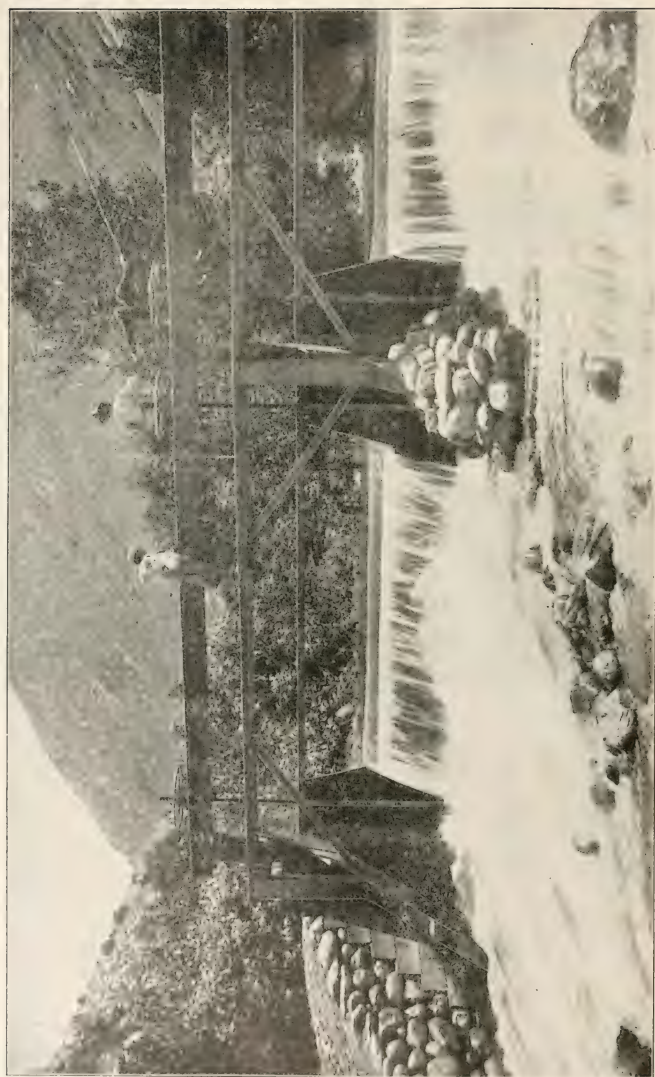
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WEIR ON BIG COTTONWOOD CREEK, UTAH.

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No. 4

NEWS AND NOTES

The Eastern Reserves

All efforts for the establishment of national forest reserves in the Southern Appalachians and the White Mountains are being centered in the hearing to take place before the House Committee on Agriculture Wednesday, April 25, at 10:30 A. M. It is of the greatest importance that all friends of the bill to establish these reserves give their assistance at this time. The bill has already had a favorable report in the Senate and is likely to reach a vote there any day. But it is in the House that the most force will be needed to secure early and favorable action. All those who feel a deep interest in this measure and have not yet done so should write or wire their views to their Congressmen at once.

Forestry Board for Maryland

The bill creating a forestry board for the State of Maryland, introduced by Senator Brown, of Garrett county, passed the legislature shortly before the close of the session, and was signed by the governor. The bill provides for a board composed of seven persons, of which the governor, the president of Johns Hopkins University, the president of the Maryland Agricultural College, the State geologist, and the State comptroller are ex-officio members, while the two remaining members are to be practical lumbermen, residents of the State. The bill also provides for a State forester, who shall have a practical and theoretical knowledge of forestry and the board is now looking for such a man. An important section of the bill authorizes the purchase of land in the name of the State, at a price not to ex-

ceed \$5 per acre, suitable for forest culture and reserves, using for such purposes any surplus money which may be standing to the credit of the forest reserve fund. Stringent provisions for the prevention of forest fires are also included in the bill.

Obituary

Theodore Sedgwick Gold, a veteran agriculturist of Connecticut and one of the very first in his section of the country to take an interest in forestry, died at his home in West Cornwall on March 19. In addition to his connection with many other organizations, Mr. Gold was an active member of the American Forestry Association and took a keen interest in all that pertained to forestry in this country. He was also a valued contributor to this magazine from time to time.

Forest Reserve Administration

That the Forest Service is being conducted on a high plane is shown by the fact that since the transfer of forest reserve administration from the Department of the Interior to the Department of Agriculture, a number of supervisors and rangers have been dismissed from the service for wrongdoing, after careful investigations. Criminal proceedings were brought against one supervisor, Everett B. Thomas, of the San Gabriel Forest Reserve, with headquarters at Los Angeles, Cal. It was found that his accounts, for a period of over three years, had been constantly falsified. Indictment was secured against Thomas last fall on fifteen counts, and on March 16 he was convicted on ten of the counts. On March 20 he was sentenced to three years' imprisonment at hard labor with a fine of \$7,000.

The forest reserves, which now cover an area as great as New England, the Middle States, and Maryland, will require for their administration a small army of officials. It is absolutely necessary to prevent collusion and graft between these officials and would-be users of reserve resources who are not particular about the means to a desired end. The Forest Service will continue, by inspection and all other means at its disposal, to guard the public and the government against improper official conduct, and it is believed that this conviction will be a great help toward eradicating official malfeasance altogether.

Ranger Convention A ranger convention was held in California at the headquarters of the Sierra Forest Reserve, on Malum Ridge, near Northfork, Madera county, beginning April 12, 1906. When Supervisor Charles H. Shinn called the convention to order there were rangers, forest guards, candidates for ranger, inspectors, and several invited guests present. Some rangers had come through stormy weather full 60 miles over mountain trails, leading their pack-horses. They made their camps in various cabins, and some tents had been pitched for the late-comers. Some of them brought their wives and arranged to stay for nearly a week.

The object of this convention was to plan the work of the coming summer in this forest reserve. Incidentally,

accustomed them to first-class team-work. The convention lasted three days, and the various subjects brought up were discussed freely by the rangers. Among those subjects were the following: "How Rangers Should Keep Books and Records," "Trespass Cases, and How to Handle Them," "Timber Sales from Application to Completion," "The Forestry System, and the Washington End of the Work," "Grazing Problems," "How to Deal with the Public," "Trails and Trail Building," "Forest Fires."

Iowa Forest Bill A bill to encourage the planting of forest and fruit trees in the State of Iowa was recently enacted by the general assembly of the State. It provides that on any tract of land in the State of Iowa the owner may select a permanent forest reservation not less than two acres in continuous area, or a fruit tree reservation not less than one nor more than five acres in area, or both, and that upon compliance with the provisions of this act, such owner or owners shall be entitled to an assessment on a taxable valuation at the rate of one dollar per acre for the land. The bill outlines very fully the conditions upon which such benefits accrue. Persons interested in the bill should ask for House Bill 209. The bill further provides that the Secretary of the Iowa State Horticultural Society shall be State Forestry Commissioner.

CONFERENCE OF ENGINEERS

First Meeting of a National Advisory Board Invited by the President to Co-operate with Government Bureaus in the Study of Fuels and Structural Material.

THE National Advisory Board on Fuels and Structural Materials has just held its first meeting, at the invitation of the President, in Washington, D. C., to consider the investigations, past and prospective, of the U.

S. Geological Survey upon these subjects, and to suggest methods of increasing the value of the work. Upon organizing, Dr. Charles B. Dudley, of the Pennsylvania Railroad, was elected president; Lieutenant Colonel O. H.

Ernst, of the Isthmian Canal Commission, vice-president, and Richard L. Humphrey, president of the National Association of Cement Users, secretary.

The government officials and engineers engaged in testing reviewed their past work and its significance, and presented detailed plans of further investigations. In the discussion of these plans many practical suggestions were made, and new questions which had arisen in the different lines of work were brought out. For instance, Mr. George B. Post, a New York architect of long experience, spoke of the scarcity of authoritative information on the strength of many building materials. He said that had it not been for his training as a civil engineer, which had taught him the amount of strain materials would stand, he could not have slept nights while constructing the sky-scrapers demanded in the business life of the present age. There is no published manual which gives full information, and for this reason structures of all kinds are overweighted with an unnecessary amount of material as a blind precaution against possible failure in any part. The transportation and handling of needlessly bulky pieces of construction material is of course undesirable, and the cost and, in the case of timber, the growing scarcity of supplies make it necessary to economize and to seek cheaper substitutes so far as safety will permit.

The Forest Service, then the Division of Forestry, began studies of American woods in 1891. These were continued until 1896, 32 species in all having been tested as to their strength and other characteristics. These tests were made on selected small pieces, so that the figures could not always be applied with safety to large pieces taken from the open market, the strength of which is influenced by such defects as knots, checks, crooked grain, etc., in combination. Furthermore, the tests did not become generally known or accepted by practical engineers and architects.

In the case of the other investigations of the Forest Service, although a large body of valuable data had been gathered and published, it had not reached the men for whose direct benefit it had been sought. What was required was a carefully planned scheme of co-operation between the government and private interests for the gradual practical application of the new knowledge.

In the case of important government tests now under way and others soon to be started, both delay and expense are to be avoided by enlisting the interest of prominent engineers from all parts of the country and representing diverse interests. These men, thoroughly acquainted with the purpose and value and every detail of the experiments, will be ready to give them immediate application and to secure for their results a ready acceptance throughout their large organizations. By examining the plans for investigations in advance they will also be able to make such suggestions as their varied experience may call forth, and in this way will help to make the work of the highest value.

The list of members of the National Advisory Board of Fuels and Structural Materials is as follows:

From the American Institute of Mining Engineers—John Hays Hammond, past-president, Empire Building, New York; Robert W. Hunt (of Robert W. Hunt & Co., testing engineers, Chicago, Pittsburg, and New York), Chicago, Ill.; B. F. Bush, manager and vice-president, Western Coal and Mining Co., St. Louis, Mo.

From the American Institute of Electrical Engineers—F. B. Crocker, professor of Electrical Engineering, Columbia University, New York; Henry C. Stott, superintendent motive power, Interborough Rapid Transit Co., New York.

From the American Society of Civil Engineers—C. C. Schneider, president, chairman Committee on Concrete and Reinforced Concrete, Pennsylvania Building, Philadelphia, Pa.; Geo.

S. Webster, chairman, Committee on Cement Specifications, city engineer, City Hall, Philadelphia, Pa.

From the American Society of Mechanical Engineers—W. F. M. Goss, dean of School of Engineering, Purdue University, Lafayette, Ind.; Geo. H. Barrus, steam engineer, Pemberton Square, Boston, Mass.; P. W. Gates, 210 State Street, Chicago, Ill.

From the American Society for Testing Materials—Charles B. Dudley, president, Altoona, Pa.; Robert W. Lesley, vice-president, Pennsylvania Building, Philadelphia, Pa.

From the American Institute of Architects—George B. Post, past-president, 33 East Seventeenth Street, New York; William S. Eames, past-president, Lincoln Trust Building, St. Louis, Mo.

From the National Brick Manufacturers' Association—John W. Sibley, treasurer, Sibley-Menge Press Brick Co., Birmingham, Ala.; Wm. D. Gates, American Terra Cotta and Ceramic Co., Chicago, Ill.

From the National Fire Protective Association—O. U. Crosby, chairman, Executive Committee, 76 William Street, New York City.

From the National Lumber Manufacturers' Association—Nelson W. McLeod, president, Equitable Building, St. Louis, Mo.; John L. Kaul, president, Southern Lumber Manufacturers' Association, Birmingham, Ala.

From the Corps of Engineers, U. S. Army—Lieutenant Colonel Wm. L. Marshall, Army Building, New York.

From the Isthmian Canal Commission—Lieutenant Colonel O. H. Ernst, Washington, D. C.

From the Bureau of Yards and Docks, U. S. Navy—Civil Engineer Frank T. Chambers, Washington.

From the Supervising Architect's Office, U. S. Treasury Department—

James K. Taylor, supervising architect, Washington, D. C.

From the Reclamation Service, U. S. Interior Department—F. H. Newell, chief engineer, Washington, D. C.

From the American Railway Engineering and Maintenance of Way Association—H. G. Kelley, president, Minneapolis, Minn.; Julius Kruttschnitt, director of maintenance of way and operation, Union Pacific Railway, 135 Adams Street, Chicago, Ill.; Hunter McDonald, past-president, chief engineer, Nashville, Chattanooga and St. Louis Railway, Nashville, Tenn.

From the American Railway Master Mechanics' Association—J. F. Deems, general superintendent of motive power, New York Central lines, New York; A. W. Gibbs, general superintendent of motive power, Pennsylvania Railway, Altoona, Pa.

From the American Foundrymen's Association—Richard Moldenke, secretary, Washtung, N. J.

From the Association of American Portland Cement Manufacturers—John B. Lober, president, Land Title Building, Philadelphia, Pa.

From the Geological Society of America—Samuel Calvin, professor of Geology, University of Iowa, Iowa City, Iowa; I. C. White, State Geologist, Morgantown, W. Va.

From the Iron and Steel Institute—Julian Kennedy, metallurgical engineer, Pittsburg, Pa.; C. S. Robinson, general manager, Colorado Fuel and Iron Co., Denver, Colo.

From the National Association of Cement Users—Richard L. Humphrey, president, St. Louis, Mo.

From the National Board of Fire Underwriters—Chas. A. Hexamer, chairman, Board of Consulting Experts, Bullitt Building, Philadelphia, Pa.



LURE OF THE CITY

Hope of the Irrigated West as an Offset

BY

EDWARD EVERETT HALE

Chaplain of the United States Senate.

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THIS convenient phrase, "The Rush to the Cities," is used more or less carelessly to describe one of the misfortunes of the last century which no one quite understands.

People who have to deal with it in the larger cities find themselves powerless to arrest it. In the end they come round to see that the causes of it are not of their making and that they have as much as they can do in healing the sick, in clothing the naked, and in providing homes for the homeless who are the results of the congestion of cities. As an academic phrase it means, alas! a question of no consequence to anybody. It is discussed more or less, but often among the writers on what is called sociology where one does not get much comfort.

Just at this moment one or two changes are taking place which seem to give some little help in the matter. A few years before his death the late Lord Salisbury expressed his hope that the transfer of power to considerable distances by electric wires might create a new civilization, or a new form of civilized life, by enlarging very much the number of small factory towns and diminishing in the same proportion the number of crowded "millionaire" towns of to-day. I do not think that this result has as yet followed; still it is to be looked for among the possibilities of the near future.

More effective has been the curious change in social order brought about by the trolley. The operative in the factory town is now able to live two, three or four miles from the engine which is his partner in his daily work. As one passes through the large man-

ufacturing towns of New York, of New Jersey and all New England, he sees already an increased number of comfortable dwelling-houses which are in what you might call the suburbs of factory towns. These give homes to the working people in factories where they can still see God's sky and feel His sunshine—homes with cultivated land by each of them for gardening, or if you please, for feeding a pig, a goat, a cow or a horse. This emancipation such working people gain from the trolley.

Some years ago in walking in New Hampshire I stopped to make a call on an old woman, an old friend of mine, in a comfortable house which her husband had built a dozen years before in the wilderness. I found to my regret that he had died the winter before. His widow was carrying on the place with her own hands and with no help besides but that of the good God. She told me she could do everything but plow, and that in the spring she had to hire a plowman. She told me that her husband had loaded his gun a little before he died for an attack on the hawks which troubled their hen-yard, but he had had no chance to fire off the gun and the hawks had become more audacious. Only the day before we talked together a hawk had entered her kitchen while she was at work and had seized a chicken which had taken refuge there. Would I not be good enough to go into the garden and see if I could not arrest his career?

This gave me a good text to speak about, and I suggested to her that a life so lonely as hers had great incon-

veniences. I asked her why she would not let her friends sell this comfortable little farm which she and her husband had created which would have brought, I suppose, a thousand dollars. I said: "Take your money and go back to England, to your brothers and sisters and your old home."

She replied with a fine frenzy of rage which would have sounded well in a Greek tragedy: "I go back there? Not I! I go back to their bloody Manchester where they have shut out God's light by their bloody chimbleys? Not I!" Absolute solitude, without a neighbor within two or three miles, was better than the "bloody chimbleys" of this "bloody Manchester." The woman had been glad of the chance to curse the home in which she was born.

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That is a side of the picture which one does not see as he climbs to the fifteenth story of a skyscraper in New York to attend to two or three scarlet-fever children who are in bed there. If you ask the mother of those children why she and her husband came to New York, they will find it hard to tell you. If you ask her whether she would like to take up the Manchester woman's empty house in New Hampshire, she will not know what you mean. You make your hurried visit and go across the street to the fourteenth story of another skyscraper there, and when your day is over you are in no condition to work out the question of the congestion of cities or the machinery which will arrest it.

It is easy to make faces as we meet the young countryman with his wife when they come from Podunk to New York and to ask them what they have come for; but it is foolish to suppose that the congestion of cities results from their inexperience or ignorance. There are some important people who are working with them in this matter of crowding the towns.

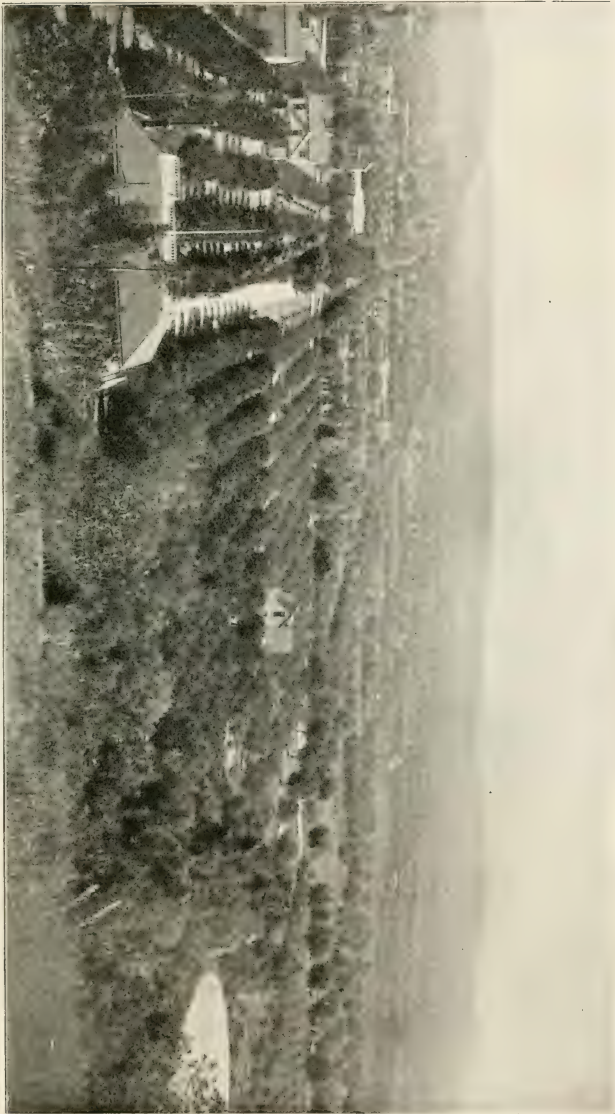
First of all, there is the large real estate interest in every city. It needs no organization; it is an organization already. The man whose grandmother owned an orchard of old apple-trees

in the heart of Boston or New York is glad that his grandmother owned that orchard. He is glad that he owns the square feet or square inches of that orchard to-day. He knows as well as I know that those square inches are worth a great deal more in money than they were worth a hundred years ago. Now that man does not mean to diminish the current of population which falls into Boston or New York. He means to keep up the price of real estate in those cities if he can. And you address him a civil note, asking him if he will not attend a meeting of gentlemen who wish to promote emigration to Idaho it is almost certain that that man will have another engagement.

Again, it is to be observed that the great cities have of necessity their own spokesmen—shall one say their own drummers?—at work for them even unconsciously. Every issue of any newspaper of the week-day or a Sunday has its announcements of the attractions of a great city. The animation of the streets, the entertainments at the theater or the concerts, the addresses made at public meetings, all are displayed, and certainly they present wonderful attraction for people whose hours pass slowly. I was talking once to an accomplished young woman who is now living in the city and will read these lines, and I congratulated her that with the end of that week of the college lectures she was attending she would be able to go to her home in North Brownwich somewhat earlier than she had expected.

"I go to North Brownwich?" said she. "Not I! I shall stay in New York till summer, if anyone will pay me five dollars a week with which I can pay my board." And when I expressed my surprise that she chose exile from home for three months she said: "If you had ever lived in North Brownwich for three months you would understand."

Now the average reader who is living in North Brownwich or New Padua or South Podunk does know that home life has many stupid sides.



Where Irrigation Has Already Made the Colony—View of Glendora, California.
Contrast this scene with the tenement districts of our great cities.

In such stupidity and its tedium he contrasts against it the varied, exciting, piquant life described in the metropolitan newspaper, and he says to himself: If there is room for four million people in New York there must be room for four million and one. Pardon him, dear reader, if he ranks himself as a little above the average of mankind—pardon him, for as you and I know perfectly well, you and I do the same.

Every forward step taken in the management of cities goes to encourage the North Brownwich man or woman in such decisions. A free library open all day and every evening, free lectures, the Central Park, the hippopotamus and the lion in The Bronx, a speech by Mr. Cockran, or by Mr. Choate or the President—such attractions as these are not set in order by people who want to enlarge the attractions of a city; but they do enlarge the attractions of a city all the same, and as a western promoter would say, they advertise it to mankind. Now it is in face of the inducements to swell the population of large cities which are thus set in order that the suggestions or arguments have to be made which would relieve the congestion of cities.

On the other hand, when I look back on 1854 and 1855 I remember that we had no difficulty then in collecting emigrants by the thousand who were eager to move from the crowded East to the West, where it was literally empty. Till the spring of 1854, I think there was no white settler in Kansas who had not been ordered to go there. I was a junior director in the New England Emigrant Aid Company at that time. We did not have to make any effort to persuade people to move from cities or factory towns upon the empty prairies. We had behind us the eager antislavery determination that Kansas should be a free State. I do not mean to say that this was a trifling inducement. But I have the experience which enables me to say that with all this generous determination behind them, hardly one of these thousands of peo-

ple would have gone into Kansas in the first three years of the beginning but that they could go together. Together is the great word in this affair, as it is in every other important affair in human life.

We did not have to say to a man living in an attic with his family that he was to take his wife and children, and that they were to work their way, choosing their own course between rival railways and through jealous States with no counsellors but themselves. What we did say was that on such a day a competent guide would meet such a party at such and such a station, men, women or children, and that they would go together to Kansas. What followed was that, as the Bible says, "the carpenter encouraged the goldsmith, and he that smootheneth with the hammer him that smote the anvil."

If a man wanted to go first and select the spot for his cabin, he left his wife and children, and we sent them after him. We did not make anybody promise to remain with his companions. We left every man and every woman free as to where they should go and where they should settle; but, as it is almost of course to say, if a hundred people went out together, coming probably from the same neighborhood and arriving after a three-weeks' journey of adventure, why, they were likely to stay together; or if anybody left the party he left it to join in some other settlement where their attractions drew him.

This fundamental necessity of maintaining "together" belongs deep down in any proposal for the removal westward of any considerable body of people from our eastern cities. Of course there is not a day when in fact John Doe with his family does not leave New York in the summer because his brother Dick or his wife's brother Tom, who is already in one of the western paradises, has sent for them. But such instances, though you could count them by thousands, are insignificant and exceptional while the country receives in the eight months of

the longer days more than a million Europeans whose first sight of America is in the seaboard cities.

The late Frederick Law Olmstead, who in fifty ways proved himself so great a benefactor to America, said to me once that while the public knew him best as one who had successfully tried to ruralize the cities, he cared more for plans which looked to urbanizing the country. He wrote with real dismay of regions quite considerable in different States where the attraction

who do not know America. An Irish officer in high position in one of the seaport cities once asked me if all the signers of the Declaration of Independence were contemporaries. That is a good enough illustration of a certain ignorance of America and Americans which makes it impossible for such men really to guide the American commonwealth.

But in the towns which are so small that the real leaders lead the town, and say: "We are going to build a bridge



Southern California Home; the Result of Irrigation.

of cities was diminishing the population of the country regions. In this epigram of his with regard to his own work he pointed out one duty which belongs to the leaders in the agricultural States. It is the duty of making small towns attractive.

I am fond of saying that fortunately for America the United States is governed by the public opinion of the smaller cities and the larger towns. For reasons which we need not discuss, the larger cities are generally under the local government of people

here," or "to lay a sewer there," or "to introduce electric light," or not to introduce it—that is to say, in a place where the leaders of opinion think it worth while to enter into the business of government—in that place public opinion asserts its own right. Such a nation as is made up by a thousand more or less of such towns has nothing to fear from any little coterie in the cities of men who are like the Phœnician navigators in the seaports of Old Spain, men who are really foreigners.

Such men as the American leaders of the small cities, especially in the small cities and large towns of the Middle West, have a large responsibility in such matters as we are discussing here, which relate to emigration from the seaport into the interior.

I have not thought that the great mass of the Middle West fully understood the importance of more careful regulation of immigrants within the United States. In 1879 I heard the Governor of Kansas say in an address to thirty thousand people that Kansas did not distress herself about securing emigrants from Europe. He said that if among the States of the Valley of the Mississippi, Kansas had her share of the immigration of that year, she would receive fifteen thousand people. And with superb pride he said: "In fact, she receives more than fifteen thousand people every day of the summer, and they come not from worn-out Europe, but from the best cities of the East, from which they bring to us the best people."

That was a magnificent boast, and as I knew Kansas and know Kansas, I think it was hardly exaggerated. Now that condition of things is one which the statesmen of the Mississippi Valley ought to maintain. They ought to see what has made such cities as Indianapolis, which I like to call the Edinburgh of America, or such towns as you see scattered through all that region from Ohio to the Rocky Mountains, from which when the country needs they send to it such men as McKinley or Grant or John Hay or Judge Day, not to name living men of whom there are so many. I believe, in face of the Kansas Governor's boast, that it would be worth while if every western State were to have a board of immigration which should watch with care the measures to be taken, to make known the real advantages of different regions.

As far as foreign immigration goes, all this is left to greed and haphazard. Twenty years ago George Holyoke remonstrated with me seriously on the blindness of our general Government

in such affairs. He said that the average Englishman who had determined to come to America was more likely than not to be guided simply by the advertising tout of some railway agent who was circulating showy pictures or pamphlets crying up particular localities. He said that no one at any port of arrival here told the Italian or the Scandinavian of the different climates between Florida and Minnesota. He said that as likely as not the new immigrant from Sicily might be guided to Northern Minnesota by some railroad agent, and that there was no one to tell him that orange-trees grew in the South and that the snow was six feet deep every winter in the North. He made the most earnest appeal for the good of mankind that the national Government would prepare an intelligible guide-book which should be circulated everywhere among the nations which contribute immigrants to the United States. As it stands to-day, I know of no such text-book, and I have made it my business to find one if it existed.

But do not let anybody think that the separate emigration of separate families is a good thing. It is a bad thing to separate men, women and children from old friends. It is a bad thing to make a family go into a region of absolute strangers and to work their way with their own habits, with their own pronunciation of words with a new language.

I do not know why we do not see in the midst of our prosperity such men as in the prosperity of Athens grew up there. When we were school-boys we read of the colony that Miltiades led, or the colony that Themistocles led, or the colonies in Sicily and Southern Italy which one young Greek and another led, as if that were the way in which young gentlemen in Greece went "into business." It was as in Napoleon's day: every young gentleman went into the army.

And we are not without such examples here. William Brewster and William Bradford led one hundred people to New England. If Brewster's fam-

ily had had to go alone, if Bradford's family had had to go alone, they would not have gone. So Winthrop led his colony to Massachusetts Bay; so Baltimore sent his colony to Maryland. Practically it was John Smith and Lord Delaware who collected the people who went to Virginia together. When our Civil War broke out or when the Spanish War broke out, young leaders of the people stepped to the front at once to say: "I will form a regiment." Practically they said: "Rally round my white plume." A man opened an office at 999 Barrack street; he issued his own bills, he

not going to hire them, I am simply going to unite them while going to take possession of the land. We will replenish the earth and subdue it." Such a man, if he were a real leader of the people, would find that in the heart of everybody whose ancestors have lived here for four generations there lingers what Mr. Hoar calls the "thirst for the horizon."

I am saying all this here, because just now there is a new chance opening before the Miltiades or Themistocles or Alcibiades, the Brewster or Baltimore of to-day. Thanks to the Department of Agriculture and the



A View of a Western Valley.

spoke at public meetings and he made his friends into recruits, bright in their new uniforms; and they enlisted other recruits, and before a fortnight had passed he wrote to the Governor that he had a thousand men who were ready to go to the war.

In days when people tell us that labor cannot get paid and has no chance, I always wonder why some American Miltiades does not hang out his banner and say: "I can give every man a chance for an estate as large as that on which is the home palace of an English nobleman. I can give two hundred families such chances as that. I am

Department of the Interior, and to such men as Senator Newlands and Colonel Walcott and Mr. Mead, and to William Smythe and to Mr. Maxwell, and to two or three thousand other men of the first ability in Washington or in the new West, all serving the good God in different ways, one million square miles, much of it of the most fertile land in the world, will be open to immigration within the next five years.

They told us a few years ago that Oklahoma was the last region of unclaimed land which the Government had to offer to the adventurer. And

we remember what a deluge of men and women filled up Oklahoma. But Uncle Sam turned over in his bed one night, and thanks to a few thousand men such as I have named, determined to reclaim a bit of desert which he had, which was desert only because the water was not well distributed. Some of these men remember the valley west of Grenada in Spain, where with a proper irrigation they raise thirteen harvests every year. And some of these men highly determined that what was left of the great American desert should be transformed into such paradises as those which you look upon from the Alhambra. A few thousand well-led men are at work at this moment on calling such a paradise into existence.

And before many years, not to say months, the time will come for the John Winthrop of the future or the John Smith or the Lord Baltimore, or the Manasseh Cutler, to hang out his banner in one of the lower wards of New York, or on First street or Second street in Philadelphia, or in some district of Chicago, and he will say: "A chance for one thousand men, women, boys and girls to go together and to make a new home!"

Perhaps he will give the new home a name. Perhaps he will call it Roosevelt, or Lincoln, or Garfield, or Newlands, or by some other name of which good men are proud. And then the young Miltiades will have to hurry backward and forward from fifty promising situations to select the place for the new home. And then on some fine day four or five giant engines will snort and blow and start, each with a score or two of cars behind it. And these cars will contain the household goods and the old familiar furniture of the thousand adventurers—will contain the choral of the child and the genealogical tree of the grandfather. And a few days more will bring them into the promised land, and in a few years there will be a "cheerful city" there "builded by their sun-burned hands."

It must be with some such leadership as this—the leadership of the young and the brave—that the rush from the cities will begin. Then they will enjoy the blessing promised to him whose "tree [is] planted by the rivers of water, that bringeth forth his fruit in his season."

HOW SHALL FOREST LANDS BE TAXED? * (In Two Parts)

PART II—A Proposition to Encourage the Growing of Forests for Profit

BY

ALFRED GASKILL

Forest Inspector, U. S. Forest Service.

HOW FORESTS SHOULD BE TAXED.

approaching this subject one naturally turns to those European countries in which forestry has become an art, for, manifestly, no oppressive burden of taxes could be borne where the

growing of trees is found to be so profitable. The conclusions from such a study are two: (1) That the systems of taxation are so radically different from ours that only general principles can be applied here; and (2) that the

*Paper read before Society of American Foresters and Fourteenth Annual Meeting of the National Wholesale Lumber Dealers Association.

assessments are always based on the actual value of the forest, or on the earning power of the land, that is, its yield.

The first principle in all these laws is that the forest shall be considered and rated apart from the land upon which it stands. This principle finds universal acceptance in theory at least, though the practice differs in the various countries, and is based upon the fact that a forest is a crop of many years' growth and represents the owner's savings—the accumulated capital and interest on a time investment. This fact is as obvious here as it is there, and in my opinion makes it necessary for us to admit that in any piece of forest property the soil alone is realty, the growing trees are reinvested income—that is personality.^a

To illustrate: A man has two fields. On one he raises corn, and year by year puts the value of the crop in bank or buys securities, which he holds and on which he pays, or should pay, a personal property tax. On the second field he plants trees; they thrive and make a good growth, but at the end of the season they are not convertible into money as the corn crop was. So it is for many years. The tree crop is made each season, but must be left on the stump until enough wood is accumulated to make it salable. Suppose the farmer, instead of selling his corn, had put it into a crib and added the second and third and each succeeding year's crop to the first; would he not accumulate personality in the crib of corn? He does the same with the product of his trees, but the result shows this difference: The crib of corn earns no increase; it represents only simple interest on the land; it is not like the money in bank that might have been obtained by selling the corn, which would earn compound interest by being reinvested with the accrued interest every year. In the growing for-

est, however, the increase in value is reinvested; the owner expects his trees to yield him a profit on the capital which they themselves represent, as well as on the capital which the land represents. But the two values—that of the trees and that of the land—are distinct.

It is thus evident that because the tree grower must reinvest his annual crop in stumpage it is no reason for considering it real estate. In the view that forests can be reproduced, trees are virtually movables, and the practice of rating them a part of the land is the fundamental error in every American State.

Theoretically it is as proper to tax growing grain as growing trees; but since the grain matures in one year, while the trees require many, and all our fiscal arrangements are based on annual returns, the trees should be taxed though the grain be exempt. Here, however, comes in the second principle in the taxation of forests, that it is unjust to require the owner to pay so long as the forest yields him nothing. There is no equity in making a man's other property carry his immature forest. In practice this works out in various ways. Most of the German States have not yet made the principle effective, but Baden exempts newly established forests from tax for twenty years (law of 1886). In Austria they are exempt for twenty-five years (law of 1869). In France three-fourths of the land tax is remitted for thirty years.^b In connection with these laws it should be remembered that forests in Europe begin to yield salable material when they are from 20 to 30 years old. In most parts of the United States the productive period begins later because there is no market for small wood.

This principle of exemption or rebate is familiar enough in this country, where undeveloped property of all

^aThe forests of the German States, for instance, are estimated to have 75 per cent. to 85 per cent. of their value in the timber and 25 per cent. to 15 per cent. in the land.—M. Endres, "Forsten," in Conrad's Handwörterbuch der Staatswissenschaften, 1900.

^bM. Endres, Die Besteuerung des Waldes, in Forstwissenschaftliches Centralblatt, p. 509, 1899.

kinds is taxed at a nominal rate. Farm land not cleared bears little. A comparison can not be made, however, with other forms of unproductive property—city lots, for instance. The owner of the latter produces nothing from his land; he hopes to gain by what others do. The forest owner, on the other hand, does produce something of value and will eventually pay a proper tax on it.

One reason why forest property is held in such high esteem in most of the countries of Europe is that the taxes are levied fairly. No matter how high the rate in any locality may be, the owner has the assurance of absolute equity in the valuation.

It would be impossible to apply the European system here with anything like the exactness that attaches to it in the old countries, because we have not the means of knowing the true worth of forest soil or of forest crops, but the principle is applicable anywhere. Even in the hands of non-expert assessors it gives a fairer basis of valuation than our present method and in the long run will insure larger returns.

This is the equity of forest taxation; but the communities have another interest than that of revenue, namely, to maintain the forests in the greatest possible extent and effectiveness for the sake of lumbering and its many dependent industries, and for the influence that they have upon stream flow and the modification of climatic extremes. These subjects are beginning to be well understood, and need not be dwelt upon.

POINTS TO BE CONSIDERED.

The points that, in the writer's opinion, should be considered in any equitable scheme of forest taxation are the following:

(1) Forests are necessary to the public welfare, and consequently each Commonwealth should bear a part of the cost of maintaining them. This means that the State treasuries should

assume a considerable part of the obligation, and, as far as is proper, relieve the counties, because a region that is rich in forest is poor in everything else—population, farms, industries—and it is right that the cities and towns should contribute to the maintenance of conditions that are as important to them as they are to the people who live close to the forest borders. Exemptions and rebates, as usually allowed, do not meet this requirement, because the county bears the burden; that is, if one piece of property pays less, all the rest must pay a higher rate to make up the deficiency. In no case are exemptions justified, unless everyone who shares the burden of it is correspondingly benefited. If a piece of private forest serves to protect a drainage area, or is valued for its beauty, it is right for all who enjoy or profit by it to pay a proper share of the local taxes. For instance, if a town or village wants the owner of a woodlot to keep it for the people's pleasure they may remit the taxes on it, because no one else is concerned.

But a State can not properly declare that its forest reserve shall be untaxed, because such action robs the counties of the revenue that they need. New York, which holds the largest State reserve, recognizes this principle and pays local taxes on its land. The Austrian state forests pay taxes on land and income. With our National holdings the same principle should apply in all cases where land previously subject to taxation is taken over.^c

(2) A forest is a form of property whose value is potential or prospective most of the time; only when the trees are market ripe can an income be derived from it.

(3) In consequence of yielding periodic returns, the greater part of the tax to be paid upon a forest should fall due when the timber is sold and not to be made a burden upon the other property of the owner through many years. The periods at which forests

^c Under a new law enacted in 1905, Pennsylvania pays to the counties, in lieu of taxes 5 cents a year for each acre of State land.

may yield returns should not be considered as the full time required to grow the average tree; some trees mature more quickly than others, and all natural forests contain trees of various sizes and ages. It is doubtful if any forest, containing the usual diversity in size or species, and now market-ripe, would not yield again within twenty years if cut carefully. This point is often overlooked, yet it is of great importance in considering the periods during which a given piece of forest would pay only on the ground tax.

(4) The deferred tax should bear a fair relation to the net yield of the property; that is, it should not exceed a sum that will leave the owner the equivalent of a fair annual return on his investment.

(5) Forests occupying land of the kind here considered grow too slowly in most situations to yield by their annual increment a rate of interest comparable with that commonly expected from ordinary business enterprises, they may easily produce wood at a rate that will compare favorably with the interest derived from State or national obligations.

(6) Forests are exposed to unusual risks from fire and depredation, owing to their very general use by the public.

OBJECTIONS.

What are the objections that may be urged to a law embodying these principles? The fundamental proposition—that forests be assessed apart from the land upon which they stand—suggests a radical change in the tax system of most States; but forestry itself is radical and demands new methods. Apart from that the only difficulty is to fix the values of land and forest. If it be admitted that forest owners are entitled to special rates on such property on account of its public value, the constitution of no State is likely to prove a bar to the necessary legislation, since existing bounty and exemption acts evidence the power of the legislatures. But if such difficulty be encountered it probably can be over-

come by putting forests into a special class, for purposes of taxation. The real questions, then, are how to fix the value of a forest and how to provide for the collection of the tax at intervals. The problem is less difficult than it appears to be. If the land alone is made to pay a yearly tax on its actual value, determined by the assessors in the usual way, the county gets at least as much income as it would if the forest were not there.

Then let the whole question of timber value be determined by what it sells for, and base the forest tax on that. Everything that comes out of the forest must pay the accepted rate of tax. Of course, safeguards must be provided; intermediate yields as well as the main crop must pay their shares, a proper return of quantities and value of material sold or used must be insured, and provision made for an adjustment of loss in the event of serious damage to the property by fire or storm. If theft is committed, it may be assumed that the county is equally responsible with the owner. The county being thus protected against loss, the owner, on the other hand, must be assured that the rate will not be raised when it is known that his timber is ready for market. The deferred returns from this source would be viewed as sinking-fund accumulations, or they might be used as a basis for bond issues to supply special needs.

A law framed along these lines would, of course, have to be adapted to local conditions and practices. Its proper execution would involve some increase in the executive personnel, yet even without that the change could not fail to be an improvement on the present system.

HOW THE PLAN WOULD WORK.

It is difficult to illustrate this plan as applied to a forest already grown, but which may not be cut for several years, without accurate knowledge of the value of the stand and of local conditions. Perhaps it would be found safe and entirely reasonable, in most cases, to remit the taxes until the trees

were cut and then collect a definite proportion of the net yield for each year that tax has been unpaid. The difficulty naturally is to determine what that proportion should be, and it can only be settled by applying the principle to concrete cases.

But it is possible to find an illustration in an example of a forest grown on ground that is now bare. Let it be assumed that 50,000 acres of pine land in Michigan, valued at \$1 per acre, will yield, eighty years hence, 350,000,000 board feet of lumber, worth \$7 per thousand on the stump. The figures are conservative, and if a young forest be already started on a portion of the area, so much the better. If the local tax levy is 2 cents, on a two-thirds valuation, the land will pay to the county $1\frac{1}{3}$ cents per acre, or \$666.67 per year. Then, if the State pay half a cent per acre on account of the public utility of the forest (see table) the county will receive \$250 more, or a total of \$916.67 yearly. In practice, the forest would begin to yield something after thirty or forty years, but for the sake of simplifying the calculation let it be assumed that it is all cut at the end of eighty years. How much of the sale price should the county get? The forest at 1 year old is actually worth nothing, hence no tax can properly be charged against it. At 2 years old it is nearer maturity, but still has only an "expectation value," based upon what the mature trees may yield. In short, the value increases year by year from nothing to \$2,450,000, when it is 80 years old.

The values upon which a tax might be levied each year are thus difficult to determine, but an average may be assumed to be the expectation value of the forest when it is 40 years old. That is \$2,450,000 discounted at 4 per cent. for forty years, or \$510,310. Then if exemption were allowed for the first thirty years the collectible tax would be the accepted rate paid on

that sum yearly for fifty years. It is manifest that the accepted rate cannot be the same as that applied to the land—2 per cent on a two-thirds valuation—for when continued for fifty years the sum of the taxes amount to nearly half the final value of the crop. Such a proportion is prohibitive, and it must be admitted that forests cannot pay the high rates commonly levied on real estate—at least, not until the crop is worth relatively more than it is now. This fact is strongly emphasized if we ignore all rebates and allowances and say that the forest shall pay $1\frac{1}{3}$ per cent of its value yearly. Eighty times $1\frac{1}{3}$ per cent equals $106\frac{2}{3}$ per cent; in other words, the whole crop would not pay the tax.

For the purpose of the present illustration, it may be assumed that the rate is one-half of 1 per cent, and, again, that money is worth 4 per cent. The total return at the time the timber is cut will then be \$389,537, or about 16 per cent of the stumpage price. It is possible that in some cases the county might claim more. The figures in any event would depend largely upon the length of time involved; but bearing in mind the importance of encouraging the owner to keep his forest standing the proportion may be accepted as about what should be paid. The county is distinctly better off than it would be under the present system, for, instead of uncertain returns or no revenue at all, if the land were relinquished, it has the assurance of a reasonable yearly revenue from the land, and a lien upon the mature forest for a further sum which, discounted at 4 per cent, is equal to \$706.65 a year.

This example does not pretend to be exact in any respect; it is purely illustrative; yet if the land value, the yield, and the interest rate be accepted as reasonable, the following table will show that both owner and community are treated fairly. If the owner's profit appear too small for the risk in-

volved it should be remembered that no allowance is made for a very probable advance in land and stumpage values.

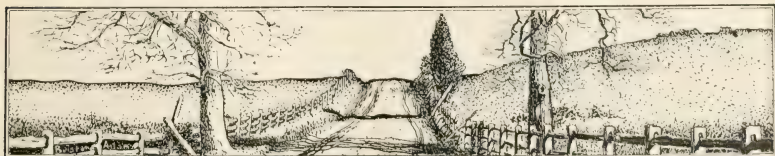
Comparison of tax collected and owner's profit from a forest of 50,000 acres yielding timber worth \$2,450,000 after eighty years.

County's interest,		Owner's interest,	
Yearly revenue from land	\$666.67	Investment:	
Yearly revenue from State	250.00	Land at \$1 per acre	\$50,000
Yearly revenue from forest, calculated from final return	706.65	Capital to produce \$666.67 yearly for land tax and \$1,000 yearly for management	41,667
Total	1,623.32	Total	91,667
Or practically 3¼ cents per acre = 3¼ per cent on a value of \$1.		Receipts:	
		For stumpage	2,450,000
		Value of land	50,000
		Capital set aside to pay taxes and management	41,667
		Gross total	2,541,667
		Less deferred tax	389,537
		Net total	2,152,130
		Profit = 4 per cent (about) compound interest on the investment.	

CONCLUSION.

In conclusion, forest taxation is peculiarly a legal question which each State must consider individually and without interference from the National Government. Any enactment must harmonize with the fundamental law and do justice to all interests. Opposition to any measure is sure to be encountered, and for that reason a radical proposition has some advantage over one which, like an exemption act, would seem to favor a class. Emphasis needs to be laid upon the point that whereas the ability of most of the States of the Union to acquire forest reserves is limited by lack of revenue, those which contain the largest areas of private woodlands have the power above all others to keep the forest in those places that are naturally adapted to it.

From these considerations it appears that the actual situation can be met only by accepting a principle in taxation which shall definitely recognize the public value of growing forests and in its application strive to maintain them as the sources of material needed in important industries and as valuable climate factors. This means that private property in forests should be taxed with reference to three considerations: (a) Necessity—the support of the local government; (b) equity—an assessment based upon the actual yield, collection of the tax (on the trees, not on the land) deferred until the crop is sold, and a recognition of the peculiar risks—fire, trespass, etc.—to which forests are subject; (c) encouragement—a special rating of the property to compensate the owner for whatever expense attaches to maintaining the forest in a condition that best serves the public interest.



HOW SHOULD OUR FUTURE FOREST LANDS BE TAXED?*

BY

S. B. ELLIOTT

Member Pennsylvania State Forestry Reservation Commission.

THE following is a tardy compliance with a promise made several months ago to discuss in the columns of *Forest Leaves* the very important and pressing subject of taxation affecting the reforestation of the waste, barren and cut-over lands in our state.

All observing persons, all land owners, and all those who have to do with the lumber interests of our country, know that as conditions now are no reforestation of those lands, whether naturally or artificially attempted, can take place while fires are allowed to devastate them or assessors allowed, as heretofore and now, to fix such values upon them and the young timber growing thereon, as may make it so unprofitable to owners as to cause them to refrain from attempting it.

It is well known that in the past many owners of valuable timber tracts have been forced, from heavy taxation, to cut and throw their product upon a glutted market to save that product from practical confiscation; and this sort of work has done much towards bringing about the present deplorable state of depleted forests.

Forest fires can and must be controlled, and it is gratifying to know that public sentiment is awakening to the necessity of it that fires, especially upon State reservations, are less frequent. While it may seem hopeless now, awakened public opinion brought to bear upon the careless, heedless offender, and the law upon the wilful one, will and must settle the matter without disagreement; but it is not so with the question of taxation. Regarding that men may disagree as their varied interests may be involved, but all

should admit that taxation should be so adjusted that it shall be equal, just, and fair as possible, and the general welfare subserved.

There is no tax for state purposes levied upon land in Pennsylvania, and whatever may be levied upon realty must, therefore, be local. The rate of such local taxation varies with the needs of the community, and only the so-called rural districts can, in the very nature of the case, place a tax upon land with young and growing timber on it. Therefore, any tax that shall fall upon land, consequent upon growing young trees thereon, must, necessarily, fall heavier upon rural districts than on towns and cities. That inequality should be relieved as much as possible, for the towns and cities require timber as much as the rural districts.

Article IX, section 1, of our State Constitution, provides that "all taxes shall be uniform upon the same class of subjects." It is held that, under this clause, land cannot be exempted from taxation, save where it shall be used for public purposes. This view is certainly logical and must be correct, and in the scheme I shall propose for relieving young growing timber from taxation, until such time as it shall reach an age wherein it shall have a commercial value when cut, will in no way conflict with that conclusion.

There can be no truthful denial that the assessor of the past (and he of the present time is of the same mind), persistently laid a heavy valuation upon all land having growing or standing timber upon it, and what he has been doing in the past he will be almost cer-

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tain to do in the future, unless positively forbidden.

Our legislature has endeavored to circumvent him to a certain extent by providing for a rebate of taxes, not to exceed forty-five cents per acre, on land which may have three hundred or more growing young trees upon it, but he promptly puts that rebate out of action by increasing the valuation on that or the remainder of the owner's holdings, and in this it may be reasonably expected that the county commissioners will uphold him. It must in some way be so fixed that it will be impossible to impose a tax on growing trees, or the owner thereof, until such trees have a value as a merchantable commodity if cut. Without that restraint no one need expect that land owners will plant or care for trees when they must wait half a century for returns on their investment and, in addition, endure increasing taxation besides.

But can this be done? Can we separate the products of the land from the land itself for the purposes of taxation? It is an established principle in taxation that land taxes may be measured by area, or they may be measured by rents—which, in a sense, is a product—or by value; and no matter which system prevails we primarily fix the value, in most cases, by what the land may produce. But suppose the rental or product of the land shall not be available in any possible way for half a century or more; can any one give a good reason why such rental or product should be subject to an annual and increasing tax?

That a tax should be levied and paid when the rental or product is received or becomes of merchantable value is not questioned nor proposed; but what is suggested is, that such an extension of time should be given as will permit the holder of the land to be in a position to realize on his, thus far, non-paying investment, and then tax for full worth as on other property. In other words, tax the land annually as land, according to the Constitution, but at no higher rate than if no trees

were growing upon it, and when such trees arrive at a marketable age, and saleable, if cut for any purpose, then tax the trees, which are simply the product, as well as the land.

Do we separate the land from its products in the matter of taxation in our State? Most assuredly. The act of the legislature referred to (see act approved April 20, 1905), practically does that by partially relieving the land of taxation. Timber growing on land may be assessed to one party while the land is assessed to another. The case is the same with coal—both products of the land. Whether timber of suitable age, or coal lying in the ground, should be taxed before removal for sale is a question not, at this stage of the argument, under consideration, but the United States Government, by act of Congress, permits dutiable goods to be stored in bonded warehouses without payment of duty until removed for sale, and the law is the same in certain cases where an excise duty—Internal Revenue—is not collected until the goods are taken from the bonded warehouses. But in regard to the timber trees referred to, the difference claimed between them and young growing ones is, that one is ripe and now merchantable, if cut, while the other is not, nor can be for a long time, and the contention is that taxes should not be levied until the growing trees shall have, at the time taxation begins, a then present value.

In this State we do not tax colts or young cattle until they are four years old—an age in which they are esteemed to have a merchantable value. A farmer may thus make a business of growing young cattle and young horses and disposing of them without being subject to taxation at all. Thus is the product of the land separated from the land itself in taxation.

The value of young trees is purely prospective. It may never materialize. Fire, disease, or insects may destroy it. It has no marketable value until large enough for use, and it cannot be conceived that our Constitution contemplates taxing non-existent or pros-

pective values. It is real ones, actual ones, present ones that should be the subjects of taxation.

It is pertinent to remark that there is more or less land in every county in our State that is unsuited for the general purposes of agriculture—land from which all merchantable timber has been removed or killed by fire. All such is subject to taxation under our Constitution, and, as the law upon stands, any trees that may now exist there, or may come to grow upon it in time, may be considered by the assessor as having a value, when, in fact, the only value that can be conceived is a prospective one. The assessor may assume such value as he sees fit and add it, increasing it each year, to that of the land for the purposes of taxation. That in our present system, right in the face of the fact that no revenue can be received for many years, and the further fact that this prospective value may be wiped out at any time by fire or disease. At the very best, land devoted to tree-growing cannot escape bearing a heavy burden. It should be placed in a separate class from that devoted to the general purposes of agriculture. A little computation will show how unequally it stands when compared with others.

It is certainly fair to assume that three dollars per acre is the net annual income from cultivated land after taxes and all legitimate charges in cultivating it have been considered. In forty years—the time required for nearly all our valuable timber trees to grow to be at all suitable for merchantable timber, and most of them require sixty or more years—the sum received will amount to \$120. As the owner gets the money each year he has the use of it, and it is but right that interest should be added. Simple interest of five per cent would increase the sum to \$240, while compound interest—and that is what should be reckoned—would make it amount to \$376.14.

Now, take an acre upon which trees shall be planted. No income at all equal to cost of planting and care, up

to forty years, can be received, except in the case of one or two species of quick-growing trees used for special purposes, and, should no additional tax consequent upon the growth of the trees be put upon it, and a tax of only three cents per acre be levied upon it to meet the requirements of the Constitution, the owner will, in forty years, have paid out \$1.20 in taxes, and putting compound interest on this the amount will be \$3.76. One case shows a gain of \$376.14, and the other a loss of \$3.76, to say nothing of the use of the money invested in planting trees and caring for them. One shows an annual net return of five per cent. on land valued at \$60 per acre that in all probability was not assessed at one-half that amount, and the other a loss of three cents per acre on whatever sum you choose to value the land at. One must look in vain for uniformity here.

But what can be said in defence of adding to the burden of the timber land by assessing an assumed, prospective value upon it? If such shall be persisted in it will amount to absolute prohibition of reforestation in this State. Under the very best system that can be devised the owners of land will not be eager to engage in an enterprise that will take so long a time to materialize.

But can a better system than that now in vogue be devised? That is the problem before us, and it is a very serious one. Taxation is a profound and perplexing question and, at best, must be a matter of compromise. However, the task of reforming our system will never be accomplished unless some plan shall be proposed, and, claiming that a better plan is possible, the following is put forth for consideration:

Let a board of competent freeholders of the county be appointed by the court, or elected for that purpose, whose duty it shall be to fix a valuation on any and all lands which the owners thereof shall elect to devote exclusive to growing trees of such species as are suitable for merchant-

able lumber. This valuation to be made every ten years, and in no case to be any greater per acre than the lowest valuation placed by the assessors on any non-agricultural, barren, treeless or waste land of any sort within the county. An appeal to the court from this valuation shall be allowed any land owner, and, upon hearing, the court shall have power to determine the sum.

If any land owner, whether non-resident or resident, shall elect to devote any portion of his land exclusively to tree-growing for commercial purposes he shall give notice, in proper form, to the assessor of the district in which such land may be located, and the assessor shall at once report the same to the county commissioners, who shall promptly lay it before the judge of the Court of Quarter Sessions of the county. Thereupon the court shall call upon the Department of Forestry of the State to appoint an expert in forestry, who shall at once examine the premises and decide whether they are suitable for growing trees of such species as will make good, marketable lumber, and to decide what species of trees shall be cared for, if any such are growing on the land, and also to decide what additional ones, if any, must be planted, or whether all must be planted, and in all cases to determine how many and what species.

If the report shall be favorable, and the land owner become obligated to the county to conduct tree-planting and tree-growing on said land in accordance with the directions and conditions which the Forestry Department may formulate and exact, then, when so planted or devoted to tree-growing, said land shall not be assessed at a higher rate nor taxed more per acre than the valuation set upon it by the board appointed for that purpose or the court, on appeal, had fixed, until the trees growing thereon shall be large enough to produce good, merchantable lumber and cut therefor. In case of planted trees this period of time should not be fixed for less than

forty-five years, except where quick-growing trees shall be raised, for special purposes other than sawed timber.

If, at any, time, the owner of any such land shall fail to maintain, in some stage of growth, such a number of trees as the Department of Forestry shall deem requisite—a designation of such number to be furnished the county Commissioners—then the land shall be removed from the list of tree-growing lands and subject to taxation as other lands in like condition are in the county.

Whenever the owner of any such tree-growing land shall deem it desirable to cut and remove any or all of the trees growing thereon, he shall apply to the commissioners of the county for a valuation of such timber trees growing thereon as he shall elect to cut and remove for use or sale, and on such removal he shall pay to the proper collectors a total tax of not more than two per cent. on the sum fixed by the county commissioners. Appeal to the court from this valuation shall be at all times a matter of right.

If any trees shall be removed at any time in order to permit a better development of those remaining, the value of the trees so removed shall not be liable to any tax unless the value in the vicinity shall be more than the cost of removal or sale, nor shall such firewood as may be necessary for use in the owner's house, or the house of any tenant thereon, in his service, be liable to any tax.

The tax which may fall due at the time of cutting of said trees shall be a lien upon the same, and upon the land upon which they grow, and when the same shall be cut and removed the tax must be paid by the party so cutting and removing them.

Much detail is necessarily omitted in the foregoing, the object being to show, in a general way, a method to relieve tree-growing land from unjust taxation, yet give to the public fund its due and equitable proportion of tax on property when that property becomes of merchantable value, but not before.

If putting a tax on timber when sold shall not be thought advisable, then when the trees shall arrive at an age when some can be profitably removed for sale, say at the age of forty-five years from time of planting or electing to care for growing trees for lumber that may be growing on the land at such time, a certain portion of said land may become taxable as timber land now is. If, on arriving at the age of forty-five years, one-twentieth shall be set apart for such taxation, and a twentieth each year thereafter until all shall become taxable, an age of sixty-five years will be reached. Some of our timber trees will have then arrived at a suitable age for the manufacture of lumber; but if the owner shall not then elect to cut the timber he will be paying tax on his land same as now. In this system there should be no tax levied when the timber is cut, for the tax began before that was fit and suitable for lumber.

But it may be said that in both these proposed systems the timber has all the time been growing in value, but has paid no tax. True, but it has all the time been costing its owner money—the use of money invested in the land and in the planting of trees and caring for them, and he has received no revenue—nothing to pay taxes with. The same can be said of buildings or constructions for any purpose which may be going on for the improvement of property. But who claims the right to tax such improvements until completed, providing they are pushed forward to completion as rapidly as possible?

To suppose that our National and State governments will be able, from their limited holdings, to supply this country with the requisite amount of timber that our civilization demands is to suppose what cannot occur. Individuals, municipalities, corporations, companies and trustees of estates must engage in tree-growing, and that speedily, or there will be so disastrous a timber famine that the car of progress in this country will not only advance, but will go backward. Some

relief and protection to tree-growing must be given or it will cease. Whoever may engage in it will suffer enough in waiting for it to mature and in tying up money invested in the enterprise, and should be exempt from taxation in any form. Full relief can not be given under our Constitution, and it should be amended. It should conform to the changed condition of things. With us tree-growing is new. It is unlike any other enterprise, because of the long period of time taken to bring returns. At present only such relief as has been here suggested, or in some other form which will prevent confiscation, can be given by our State. But the government of the United States can and should aid in the matter. A bounty on tree-growing would be of far more benefit to the country at large than a bounty on beet sugar, and a tree distribution of tree seeds and young trees of equal, if not greater, benefit than free garden seeds.

Note.—Since writing the foregoing, I have discovered that Dr. J. T. Rothrock, former Commissioner of Forestry of Pennsylvania, now of the Forestry Commission, held substantially the same views of the injustice of taxing growing timber that I have set forth. This he did in an article entitled "Vanishing Industries," published in the Report of the State Board of Agriculture for 1894, page 223, a part of which is here given. I make this reference with great pleasure, as he thus saw, in the early days of the forestry movement, what must sooner or later be met. I was not aware of this declaration by him when I sent you the article, or I most certainly would have given credit to this worthy pioneer, whose clear vision saw what and must be done.

S. B. ELLIOTT.

"As for the taxation of standing timber, one may as well come out on a distinct platform at once; it is a wrong, both to the owner and to the Commonwealth, but chiefly to the latter. It is false in principle, for it taxes a

man for a benefit which he has not yet received. If a timber owner holds land twenty years and then sells at an advanced price, he then receives his increment and income, for both of which he should pay. So also he should when he realizes on his investment by cutting the trees. But, taxing standing timber is not only false in principle, but is pernicious in its results, because it is confiscating (practically) the lands, to avoid which the owner cuts the trees, and so inflicts an injury (as things now are) on the State. There are known methods of doing this.

"It is objected that if growing timber is exempted from taxation, it would work a wrong to the poorest counties, because it would leave them without requisite funds for opening and repairing roads. This, of course, would be bad enough, but is it any more than taking the taxes and failing to repair the roads? The argument may prove too much.

"Let us look just a little down into the future: This good-road question is a rising one. It will not down. It has come to stay, and we may frankly meet the issue. The State requires ready means of communication from place to place. Without them we should be largely at the mercy of the railroads. In proportion as these are good we are less dependent of the railroads.

"Now, is it not possible that we should be taking a step on which the wisdom of the future would pronounce favorably if we were to do this?

"Remove the tax from standing timber until it is sold or cut. And whatever revenue a township loses, by thus exempting the timber, let the State restore, to be expended under competent supervision in maintaining a proper road system in that township.

"It will be observed that this grants the largest aid just where need of development is greatest, and that the State helps itself as much, or more, than it helps the townships."

MANAGEMENT AND NATURAL REPRODUCTION OF CHIR PINE NEAR DEHRA DUN

BY

T. S. WOOLSEY, Jr.

Forest Assistant, United States Forest Service.

TO the American forest student the hill forests of the Eastern Himalayas are perhaps the most interesting and instructive in India. The species at elevations over 4,000 feet are in many ways similar to the pine and spruce forests of the United States. The chir pine is similar to our Southern pines, especially in the ease of natural reproduction when protected from fire. The blue pine is practically our white pine. The spruce and fir forests differ chiefly in the difficulty of their reproduction and the absence of the hardwoods in mixture.

The hill forests visited by the writer lie between Chakrata and Simla. Those bordering Chakrata and the Tous River (headwaters of the Ganges) are administered from Dehra Dun under the Jaunsar Division. This forest division is one of the most important in India, and most deserves a visit on account of its intensive silvicultural treatment and the interesting methods of lumbering. Their wet timber slides are especially ingenious in that the ties themselves serve as the sides of slide until the "drive" is completed when they in turn are sent to market. The

last Jaunsar working plan divided the forest into three zones, based upon elevation above the sea level: 1. Temperate Zone, 3,000 to 6,000 feet, with chir pine (*Pinus longifolia*) and ban oak (*Quercus incana*), as the chief species (see fig. 1). 2. Subalpine Zone, 6,500 to 9,000, with deodar (*Ce-*

is next in value, and its popularity is upon the increase, while the blue pine, spruce, fir, and oak are practically unmerchantable unless close to where there is a demand for fire wood. Of these latter species the blue pine seems to be the least desirable. In some parts of the mountains it has been girdled



Fig. 1. — General view of mature chir pine forest along tributary of Tons River. This forest is open to grazing and is burned over annually.

drus deodar), spruce (*Bicca moinda*), fir (*Abies webiana*), and blue pine (*Pinus excelsis*). 3. Alpine Zone, 9,000 to 11,125, with moru oak (*Quercus dilatata*), spruce, fir and deodar. The demand for insect resisting railroad ties make the deodar by far the most valuable species. The chir pine

extensively and arbitrarily to make way for the deodar. In recent years it has begun to be valued as a nurse tree and soil protector. The average exploitable deodar (over 24 inches in diameter breast high) is worth standing perhaps \$5 to \$25 a tree. The head ranger noted a single tree to cut

800 metre gauge ties and to net about \$250! Such a stumpage price seems almost incredible. The chir pine, although always more accessible and cheaper to log, is worth only \$1 to \$5 per tree. It is hand sawed into scantlings of small dimensions and driven with the deodar down the rivers to market. Recently it has been tapped for resin.

The chir pine is not of rapid development. According to measure-

based upon the length of time required to grow the smallest merchantable size as determined from stem analysis. In Jaunsar they regulate the cutting by the well known method of periods. For example, if a rotation of 160 years had been adopted and the area of forest were 1,600 acres the working plan would allot 400 acres to each of the four periods. That is, the first 400 acres would be cut over and reproduced during the first 40 years, and



Fig. 2. — Over mature chir pine forest on Chatragdh showing windfalls of over mature trees and advance reproduction due to protection from fire.

ments made by the Indian Forest Service it takes some 100 years to grow a tree 15 inches (see fig. 2) in diameter. It is a prolific seeder, however, every two or three years, and with protection from fire the reproduction is a certainty. Owing to this ease of obtaining reproduction the management of these pine forests is perhaps the simplest in India and the most successful. They usually adopt a rotation

so on until at the end of 150 years the last of the 1,600 acres has been cut and the first acre cut contains a forest 159 years old. This method of thus securing a uniform and normal aged forest with a regulation of the yield has numerous drawbacks. Suppose the forest is mature, as is the case in Jaunsar, then the part which must wait for cutting 140 to 160 years will have lost a vast per cent of timber by death and

windfall. In addition it is more than likely that the regular gradation of age classes, for which sacrifices have been made, will be spoiled by an unexpected fire. This also has recently occurred in Jaunsar. It is a method of regulating the yield but it is apparent from the silvicultural point of view that our rapid cutting by "diameter limit" methods is more desirable. By our methods we utilize rapidly the mature timber before it has time to

ing for the other blocks to remove the dead and dying veterans and to aid the advance reproduction. It must be remembered that in India a sustained annual yield is usually vital for the best interests of the native population. In addition the successful marketing of the timber demands a steady annual supply.

In the Jaunsar Division they have with success secured their reproduction by reserving 5 to 10 seed trees



Fig. 3. — Cleared fire line, 200 feet wide, in chir pine forest near Tous River. Tall dry grass and chir reproduction in foreground.

die. The whole forest is often completely cut over in a cycle of 20 to 40 years, while in India the Janusar forest, according to the working plan must wait 160 years before it is cut over. This method by periods was varied by Mr. E. E. Fernandez in his working plan for the Ranikhet Working Circle of the Naini Tal Division. In addition to the regular fellings by periods, he prescribes a selection fell-

per acre (see fig. 4). They reserve the small, thrifty trees which will be most benefited by an extra period for growth. Successful regeneration usually takes 10 to 15 years. It is interesting to hear that the local forest officers believe the moderate grazing of cattle greatly helps the reproduction, as otherwise the grass and needles cover the mineral soil to such an extent that the germination of the seeds is

impossible. They believe the cattle break up the needles with their hoofs, keep the grass down, and do not pack and harden the soil because the steep hillsides tend to prevent their yarding long in one place. When the understory of young growth is complete a total clearance of the seed trees takes place. Some officers believe that a few of these trees should be left as an insurance in case of fire. Quite recently

reason is sometimes given why these insurance seed trees should not be left. They fear that in localities where electric storms are frequent these scattering seed trees would attract the lightning and be the cause of forest fires.

To give a more exact idea of the condition of the forest during and after regeneration two plots are described below. These were located by the writer in fairly average forest, al-



Fig. 4.—Result of fire protection commenced in 1890 and seed felling made in 1894. Five to ten chir pine seed trees are left on each acre.

a large area of completed reproduction was destroyed by fire and now the only means to replace it is by costly artificial reproduction. Had they retained only the two seed trees per acre, in the course of 20 years the area would probably have been completely restocked. Even if no fire takes place there are always the small blanks caused by the removal of the seed trees which ought to be filled. A curious

though they are undoubtedly above the average for any large area. One plot was measured under the direction of the writer, while the Indian Forest Service kindly gathered the data for the other. One plot of 20 acres was in the Dhulich Block, Jaunsar Forest, which was closed to fire in 1890. The seed felling was made in 1894 (see fig. 5). The final felling had not yet taken place, and in April, 1905, there



Fig. 5. — Result of the 1894 seed felling. The reproduction is nearly complete



Fig 6.—Interior of chir pine reproduction after the removal of the seed trees. The

were six seed trees per acre, ranging in girth from $2\frac{1}{4}$ to $3\frac{1}{4}$ feet. There were 818 trees under 5 feet in height, and 1,312 over 5 feet, or a total of 2,130 per acre. There were four blanks on the two acres, averaging 30 feet in diameter and amounting to one-eleventh of an acre. The other plot was 1.6 acres in area and is in the Chatragodh Block of the Jaunsar Forest. The first seed felling was made in 1885, and the final removal of seed

can lumbering, these trees were all sawed or chopped into lumber where they were felled in the forest. On the 1.6 acres there were 6 blanks with average diameters of 28 feet or only about one-twelfth of an acre. With successful fire protection a fully stocked chir pine forest is assured, and this at practically no expense (see fig. 7). The illustrations, figures 1 to 7, show the chir forest before, during, and after these reproduction cuttings have been



Fig. 7.—Final results obtained by natural chir pine reproduction on the Tons River. On the left a fire line runs up the ridge to where seed trees still remain. Below are cultivated fields.

trees took place in 1899 and 1900. The measurements made in December, 1904, showed an average per acre of 1334 trees over five feet in height, 65 trees under five feet or a total of 1,369. Twenty-five trees were either suppressed or already dead. The plot was not uniformly stocked with young growth on account of the blanks caused by the first removal of seed trees (see fig. 6). Contrary to Ameri-

made. While some details could be improved, yet how different is this conservative treatment from our own slash and burn, which has devastated such vast areas. The natural reproduction of almost all our pines, especially in the South, can be readily secured by conservative lumbering and fire protection and the future ought to show equally good if not better results than obtained in British India.

THE LAND OF OPPORTUNITY.

BY

C. J. BLANCHARD

Statistician, U. S. Reclamation Service.

THE man who earnestly and intelligently seeks an opportunity in this country to better his material welfare will generally find it. The same amount of well directed effort which brings a man success in the east and

ment than anywhere else in the world. This is not an idle statement, but is readily substantiated by an examination of county records, of the per capita deposits in banks, and by the average value of farm products per acre.



Minidoka Dam, nearly closing the Snake River, Idaho.

middle west, if applied in almost any part of the Pacific Coast region, will be crowned with a larger degree of prosperity. A very general reconnaissance of the great States of Oregon, Washington, and Idaho furnishes most convincing evidence that intelligent husbandry in these states is awarded by higher returns according to invest-

If this evidence fails to convince, personal observation will establish the truth of the statement beyond doubt.

Statistics are always mighty dry reading. The average man shys at a column of figures as does a range horse at an automobile. He needs to be shown on the ground or demands a literal matter of fact statement.

In discussing opportunities in the far west a writer is confronted with a serious obstacle and that is the difficulty of selecting a location and sticking to it. After journeying over thirteen states and three territories the tendency is to scatter your facts, and the reader who wants details usually fails to get them.

The remarkable transformation which has been wrought in the Great

million acres are producing bountiful harvests in the valleys where only a short time ago desolation reigned supreme. Within five years the acreage reclaimed has doubled and the population of the cities and towns has increased by leaps and bounds. The end is not yet. While the day of the pioneer with his small ditch leading the waters of mountain streams upon the thirsty land is over, the time is



View showing five Coffin 8x12 regulating gates, Diversion Channel, Minidoka Dam, Idaho.

American Desert in a period of less than a quarter of a century, has served to awaken a lively interest in this vast region, so long regarded as the nation's waste place. While progress has been the watchword all over the arid region no more emphatic demonstration of the potential greatness of the rainless country can be found than that which is presented by the Snake River Valley in Idaho. To-day more than a

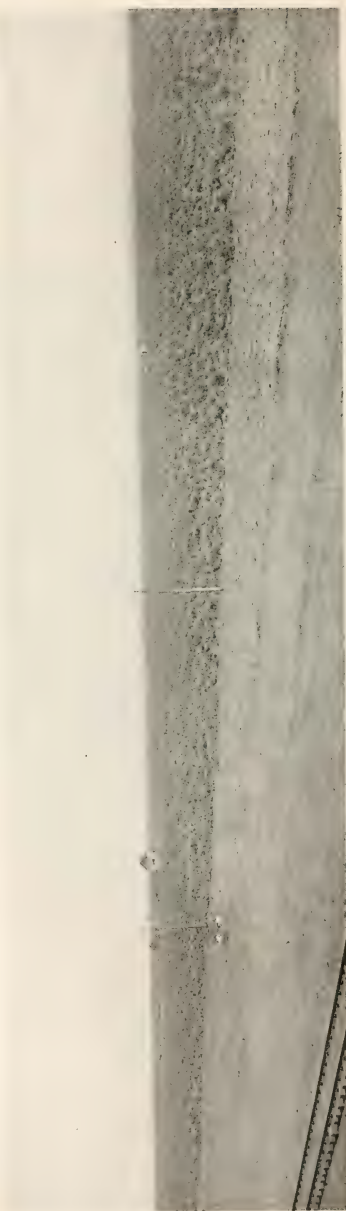
ripe and advantage is being taken of the opportunities for initiating engineering works on a large scale to extend irrigation to sections beyond the reach of the individual farmer. Corporations with large capital, tempted by the great promise of returns from irrigation systems, have constructed and are extending large irrigation systems to cover hundreds of thousands of acres of fertile sage brush plain.

The Government, too, the principal owner of the unoccupied lands of the valley, has determined to improve and make marketable its property and establish thereon thousands of new homes for intelligent, independent, and prosperous farmers.

The Minidoka project which lies on both sides of Snake River in southern Idaho embraces 130,000 acres of choice land. Its engineering works, now rapidly nearing completion, are a dam of the rock-fill type 650 feet long on top, 50 feet high, requiring the placing of 110,000 cubic yards of rock, 101,000 cubic yards of earth, 1,200 cubic yards of rip rap, and 1,000 cubic yards of concrete in core wall. The spillway and main canals, 21 miles in length, will carry the water to the laterals which have a length of 102 miles. The canal excavation required the moving of 3,500,000 cubic yards of earth, 45,000 cubic yards of loose rock, and 170,000 cubic yards of solid rock. Nearly 19,000 horse power will be developed from the dam.

A transformation little less than marvelous has followed the initiation of this great work, and while it has a parallel in the opening of a similar project by private enterprise, in that section a year before, it is nevertheless worthy of note. A year ago last spring the Minidoka tract was an uninhabited, dusty sagebrush plain,—a spot forbidding, desolate and uninviting. To-day the land which is embraced by the lines of canals is dotted with farm houses, three thriving towns containing 125 business houses have sprung up. A new railroad traverses the whole tract and 4,000 people are now living where two years ago there was no habitation.

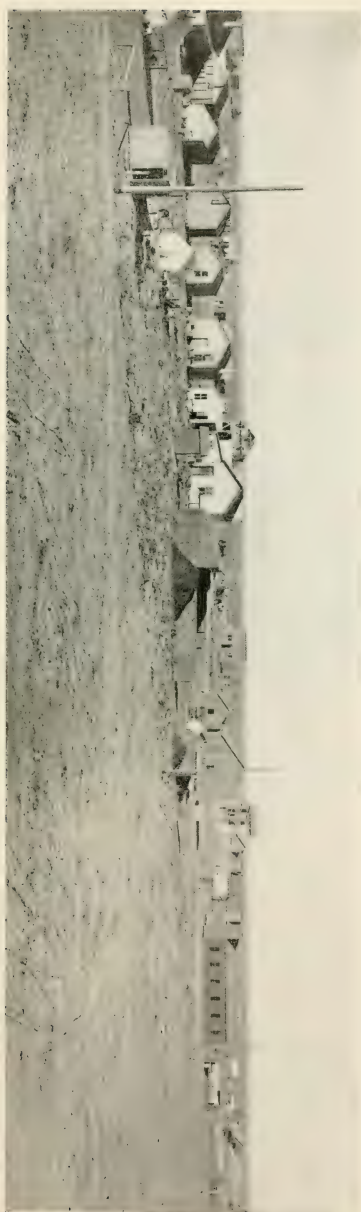
These thriving towns are located on land which is held by the Government for townsite purposes. Congress recently passed a law providing for the sale of the town lots and the date of the sale will be announced in the near future. Sale will be at public auction for cash to the highest bidder. As an opportunity for investment or a desirable location for establishing a business these towns are particularly in-



Looking Northwest from Rupert, Idaho, Showing Some Improvements.



Heyburn, Idaho, Looking Southwest.



A View of Rupert, Idaho.

viting. The irrigation system will be completed in 1907 and more than a thousand farms will be under cultivation. Such a farm population will cer-

the Government for municipal and manufacturing purposes, the towns should make rapid and substantial progress. Everything predicates the



A Chicago "Kid" Reporter's Enterprise at Heyburn, Idaho.

tainly provide for a prosperous future for these towns. With almost unlimited electric power at the disposal of

success of the Minidoka country and its early development into a model agricultural community.

THE RECLAMATION SERVICE

Progress of National Irrigation Work During the Past Thirty Days

Reclamation Work in California

Commendable progress is being made on the national irrigation works in California. On the Klamath project the Secretary of the Interior has formally approved the contract between the Klamath Water Users' Association and the United States. This is a rati-

fication of the plans for constructing the Klamath project and involves the ultimate irrigation of about 250,000 acres of land. The amount equals the total irrigated area in southern California proper. Construction contracts amounting to approximately \$400,000 have been signed and construction

work is now under way by contractors Mason, Davis & Co., of Portland, Oregon. The Pacific Portland Cement Company, of San Francisco, were the successful bidders for 10,000 barrels of cement at \$1.55 per barrel for use on this work. This firm is now supplying cement on the forty-thousand-barrel contract for the Yuma project, and has also furnished all the cement so far used on the Truckee-Carson project. The board of engineers which met at Klamath Falls on the 28th instant considered plans for new construction work and arranged details for the building of the entire project.

On the Yuma project the Secretary of the Interior has authorized the construction of the Gila Valley levees by force account at an expense of \$100,000. These levees will be the only perfect levees ever constructed in this country. The work was started on March 12. In connection with the levee work the Secretary has authorized the purchase of 100 mules with their equipments, and the Government is now prepared to purchase these animals. In accordance with the general policy of the service a number of small contracts amounting to approximately \$1,000 each, have been let to the farmers of the Yuma Valley for the extension of the Yuma Valley levee toward the Mexican line. On the Laguna dam J. O. White & Co., contractors, are employing 450 men at present, and have just installed dredges and other machinery on the California side of the river at this dam site. This force will be doubled within the next thirty days. This firm was awarded the contract for the construction of large sluice gates and regulator gates for the entrance of the canals at the dam. There will be three of these steel gates, each 33 feet wide and about 20 feet high, and costing about \$65,900. They will be of the type known as "Stoney Gates," and are similar to those used on the Chicago drainage canal and the great locks at Sault St. Marie.

Flood Damage Over- estimated

An associated press dispatch from Caspar, Wyoming, stated that the great dam at Alcova and steel bridge across the North Platte River, structures erected by the Reclamation Service, were carried away by a flood on March 27, entailing a loss of \$100,000. It would be difficult to crowd more misstatements into the same space than are contained in the above. In the first place the Government has not constructed a dam in the North Platte River. A contract has been let for this work and the contractor erected a temporary embankment to divert the stream from its channel in order to lay the foundations for the Pathfinder dam. This structure was swept away by a flood, but aside from delaying the work no serious damage was done. The Government erected a wooden bridge across the river near the dam site and not a steel structure, but the engineer in charge in his report of the flood makes no mention of its having been destroyed. The bridge cost only \$3,000, and if it were washed away this would represent the total loss sustained by the Government, as the contractor must stand the loss of the temporary works in the river. The Pathfinder dam is to be a masonry concrete structure, 210 feet high, and creating a storage reservoir with a capacity of 1,000,000 acre feet, or several times greater than the Croton reservoir of New York.

Sun River Project

There is great rejoicing in the Sun River Valley, Montana, over the fact that the Secretary of the Interior has apportioned the sum of \$500,000 for beginning a great irrigation work in that section. For the past two years the engineers of the Reclamation Service have been making surveys and completing plans for one of the largest of the National projects in the West.

The preliminary investigations of the Sun River project indicate that 256,000 acres are reclaimable in this

valley, at a cost of about \$30 per acre, or a total expenditure of nearly \$8,000,000. A very large percentage of this area is public domain and its reclamation will result in a very great increase in the population of the State. The irrigable area is a broad prairie extending from the Teton River on the north to the Sun River on the south, a distance of 30 miles, and from the Rocky Mountains on the West to the Missouri River on the east, a distance of 70 miles. This land, although extremely rich in all the elements of fertility, without water is only fit for grazing, but when irrigated its productiveness can not be surpassed anywhere in the United States.

The reclamation of this vast area will add to the crop-producing area of Montana a larger acreage than at present cultivated in the entire State of Rhode Island. The examinations made by the engineers show that this project is free from difficult engineering features and the topography of the country is such that it can be built unit at a time. It is probable that the first unit selected for construction will be the reclamation of 16,000 acres in and about the Ft. Shaw Reservation.

The Sun River is an important tributary of the Missouri, into which it empties at Great Falls. It flows out of steep canyons which it has cut deeply into the main chain of the Rockies.

Basing the capacity of the Sun River lands upon the average census farm returns from Montana, the Sun River Valley when reclaimed should yield of rough crops nearly 10,000,000 bushels of wheat, or 600,000 tons of alfalfa. The production of vegetables, sugar beets or fruit can not be calculated. Once brought under a perfect system of irrigation this valley will support a prosperous farm population of 15,000. It is certain to make a splendid city of Great Falls which is the mercantile metropolis of this region.

Oklahoma Investigation

The Secretary of the Interior has authorized the purchase and installation of the necessary pumping plant, in-

cluding a six-inch centrifugal pump and a twenty-five horse power gasoline engine, for the purpose of investigating the feasibility of using the waters of the Red River for an irrigation project in Oklahoma. The estimated cost of the plant is \$5,000. Owing to the presence of considerable quantities of salt in the waters of this stream, it is deemed wise to experiment on a small scale before initiating a large gravity system.

Fort Buford Project

The Secretary of the Interior to-day authorized a new contract for the construction and repletion of divisions 5, 6, 7, and 9, and a number of lateral ditches, in connection with the Ft. Buford project, North Dakota and Montana. The original contract with the Widell-Finlay Co. has been suspended on account of the failure of this company to commence the work as provided in the proposal, and the new contract is entered into with John A. Nelson, of Minneapolis, who agrees to complete the work by September 1, 1907, at the price named in the original contract. The Secretary's authority for the new contract is conditional on the furnishing of a new bond for \$25,000 by the American Surety Company, and upon its agreement that its liability on the original bond shall remain in full force and effect.

Pecos Valley Reclamation

The Secretary of the Interior on March 21 signed a contract with the Pecos Water Users' Association of Carlsbad, N. M., whereby the latter agrees, in conformity with the provisions of the Reclamation Act, to guarantee to the government the return of moneys expended in the construction of the Carlsbad project.

One of the last steps in the negotiations between the government and the Pecos Irrigation Company, Carlsbad, New Mexico, was taken March 21 when the Secretary of the Interior approved a contract for the transfer of the property of the company to the United States, for the consideration of \$150,000.

Opinion of Homestead Entries

The Director of the Geological Survey recently requested an opinion from the Department of the Interior as to whether a homesteader whose entry is within the irrigable area of an irrigation project, but not subject to the restrictions, limitations, and conditions of the Reclamation Act, may sell a relinquishment of part of his entry.

The Assistant Attorney General has rendered an opinion which is approved by the Secretary of the Interior, that an entryman who has not acquired title to his lands may not convey or agree to convey to a water users' association one or more legal subdivisions of his entry, to be held in trust by such association and sold for the benefit of the homesteader to persons competent to enter such lands, under the same form and in the same manner now provided for the conveyance and sale of lands in private ownership lying within the limits of an irrigable area.

The opinion recites that one of the indispensable conditions of the homestead law is that the entry must be made for the exclusive use and benefit of the applicant and not "either directly or indirectly for the use of any other person." (Revised Statutes, Sec. 2290.) In submitting final proof, the entryman is required to make oath that "no part of such land has been alienated, except as provided in section twenty-two hundred and eighty-eight" (Sec. 2291), which provides for alienation for church and cemetery purposes. Under such prohibition, "a contract by a homesteader to convey a portion of the tract when he shall acquire title from the United States is

against public policy and void" (syllabus), *Anderson v. Carkins*, 135 U. S., 483.

Until the homesteader has acquired either a legal or equitable title to the land, he cannot make an agreement to convey any portion of it that will secure to another any right or interest therein. He may relinquish all or parts of it, but the relinquishment must be to the U. S. and the land relinquished becomes public land subject to entry by the first legal applicant. If the land relinquished is within the irrigable area of a reclamation project, it becomes subject to the provisions of the Reclamation Act.

Eight Hour Day

In connection with the construction of irrigation works by the government, especially that which is being done by the Reclamation Service engineers under force account and not by contractors, an interesting question arose as to whether the act of August 1, 1902 (27 Stat., 340), and the act of June 17, 1902 (32 Stat., 388), are intended to fix the number of hours per day, when the employment is by the day, and if such be the case whether if these laborers are employed by the hour it would be lawful for the engineers of the Reclamation Service to require or permit them to work ten hours per day. The Assistant Attorney General has rendered an opinion which the Secretary of the Interior approves, holding that but eight hours labor per day can be required of laborers on such work, except in cases of extraordinary emergency, to be determined by the Secretary of the Interior.



THE FOREST SERVICE

History of a Month's Government Forest Matters

Forest Reserves and Irrigation

The establishment of the Blue Mountains Forest Reserve, embracing 2,627,200 acres of the mountainous region in the center of Eastern Oregon containing head-waters of the John Day, Umatilla, Malheur, Silvies, and other rivers, has an important bearing upon the work of the U. S. Reclamation Service in that part of the State. The success of the widely-separated Umatilla, Malheur, and Silver Creek projects, located, respectively, at the mouths of the John Day and Malheur rivers and on Silver Creek in Harvey county, depends, in large measure, upon the conservation of the water supply within the great drainage area embraced in this reserve. The creation of the reserve will, consequently, have a very direct effect in bringing about the agricultural development of the greater portion of the State lying east of the Cascade Mountains, which needs only irrigation to develop the fertility of millions of acres of land.

The great agricultural possibilities of this part of Oregon has led the Reclamation Service to undertake a number of irrigation projects, necessitating extensive examinations by the U. S. Forest Service of the forest cover throughout the several drainage basins involved, with a view to extending the protection of forest reserve administration over all important watersheds. As a result, the wild mountain regions embraced in the forest reserves will be carefully patrolled, at government expense, to prevent disastrous fires, and all other possible efforts will be made to sustain and regulate the streamflow of those regions.

In other words, the work of these two scientific branches of the government is being conjointly directed towards bringing about the reclamation of vast areas of land in eastern Ore-

gon. While the tracts thus reserved for the application of scientific principles in conserving and utilizing the waterflow, will be made to conduce directly towards the development of other regions, it should be understood that they will, in no sense, be withdrawn from use by the public for all legitimate purposes. On the contrary, the timber, water, and herbage, the minerals, and other resources, will remain open to the use of the people, and the control exercised by the government will be directed towards bringing the lands to the highest productivity, in the interest of the various industries involved. The forested lands, for instance, will be administered with a view to insuring a continuous supply of timber to meet local demands, while the fullest utilization of the grazing products consistent with a permanent use of the range, will be allowed. Every effort will be made by the government to prevent destruction and wasteful use of resources, in order to husband them properly for the use of the people.

New Reserve in Nebraska

The government has just established a third reserve in Western Nebraska in which to extend the work of forest-planting, recently begun in the Dismal River Forest Reserve, in that State.

This new reserve, which is known as the North Platte Forest Reserve, embraces about 345,000 acres of sandhill country in Grant and McPherson counties, which at present is practically worthless, except for grazing.

The prospects, however, for growing timber on the tract are good, as it contains a suitable site for a nursery, and it is thought that successful forest-planting can be effected on the north and east slopes of the hills, where there is always moisture near the surface. Some miles east of the

reserve successful plantations of ash, boxelder, and cottonwood have already been established by ranchers, where cottonwood, in particular, has made good growth.

The forest-planting contemplated by the Forest Service in this locality is of especial importance. Part of the reserve is near the tract to be reclaimed under the great North Platte project, now under way by the U. S. Reclamation Service, and the irrigation of this stretch of country in the western portion of the State will of course create a demand for fence posts, fuel, etc., in connection with the settling up and development of the lands. Since the region is practically treeless, timber to meet this demand should be produced locally if possible.

The success which has attended the experimental operations in the Halsey Nursery of the Dismal River Forest Reserve, indicates the future importance of the government's work along this line. While the original intention in establishing this Halsey Nursery was to grow seedlings for planting on the Dismal River Reserve, it has already been found that this station can be made a distributing point for a number of other regions, and it is likely that plans will be made to grow seedlings on a large scale for shipment to other parts of Nebraska and to adjacent States. No less than 50,000 seedlings were shipped to the Black Hills of South Dakota last spring, and planted, and 40,000 more were shipped to the Pikes Peak region in Colorado. Seedlings have been raised at the Halsey Station more cheaply than anywhere else in the United States, and there is no apparent reason why the same success should not be achieved on the new North Platte Reserve, where conditions are very similar, if a nursery is established there.

It is the intention to furnish seedlings this spring from Halsey for planting in the Garden City Forest Reserve in Kansas, and a considerable number will also be shipped to the Pikes Peak region.

In establishing this new reserve the only industry that will in anywise be effected is that of grazing, which will be greatly benefited by a forest reserve administration of the tract. Permits will be granted to graze the stock which is now occupying the ranges. Should the ranges be found to be overgrazed, the number of stock will gradually be reduced each year until such a limit is reached as will secure to the stockmen a permanent use of the reserve.

Tree Planting Work

The Butters Lumber Company, of Boardman, Columbus Co., N. C., has made application to the Forest Service for a preliminary examination of 5,000 acres of land on which they contemplate planting. Mr. J. F. Bond, who is at present in the South, will visit this tract this week to determine the feasibility of preparing a detailed planting plan. The cut-over southern timberlands are of little value unless systematic plans are carried out to secure natural reproduction or to have them replanted. Substantial financial returns seem assured in either case, and lumber companies are showing increased interest in this movement. The company in question contemplated the planting of cottonwood, as it gives quick returns in a region where there is a market for pulpwood and charcoal.

Co-operation in Iowa

Plans have been approved for co-operative forest experiments between the Iowa State College at Ames, Iowa, and the Forest Service. The College is to furnish 5 acres of land for experimental planting this spring, and additional areas when available. The expenses of material and labor will be borne equally by the co-operating parties. It is the object of these experiments to determine the species best suited for varying purposes and to the soil and climatic conditions of Iowa, and to learn the silvicultural methods by which they can be most easily propagated. The work will comprise both nursery practice and field

planting, and a large number of species will be handled under different methods. H. P. Baker, Forester for the College, will be in direct charge, but the Forest Service will have general supervision.

Planting on Coal Lands

Notice has been received that the planting plan which was prepared by the Forest Service for certain lands owned by the H. C. Frick Coke Company, in western Pennsylvania, has been accepted and that planting will be begun this spring. Plant material for use on the areas to be reforested has been ordered from dealers, and a nursery will be established for the production of seedlings for future use. This work will be supervised by a representative of the Forest Service. A similar request for supervision has been received from the Keystone Coal and Coke Company, for whom a planting plan was prepared last summer.

Planting on Military Reservations

The War Department has requested the Forest Service to make an examination of the military reservations in and around San Francisco Bay with a view to their improvement by forest planting. This work will soon be undertaken, and it is expected that detailed plans will be made for planting on certain portions of the reservations. The aim will be to establish useful forest plantations which will at the same time improve the appearance of the islands and military grounds, which are now without tree growth. Special attention will also be given to the planting of windbreaks and shelterbelts for the protection of the parade grounds and buildings.

San Francisco Bay is acknowledged to be one of the safest and most beautiful harbors in the country. By establishing a forest cover on the shores and islands it will be made still more attractive. Instead of barren bluffs and islands covered only with brown grass, passengers on inbound ships will see groves of flourishing green trees.

Rise of Lodgepole Pine

The demand for lodgepole pine ties by the western railroads, which prefer them to any other because of the ease with which they take preservatives, has greatly increased the market value of the Rocky Mountain forests in northern Colorado, Wyoming, eastern Idaho, and southern Montana, where lodgepole pine is the predominant tree. These forests are largely within the existing or proposed National forest reserves, and are consequently under government control, so that the Forest Service has felt the need of preparing plans to permit the sale of such mature timber in them as may be safely spared. During the past year a working plan was completed for about 46,000 acres in the Wyoming Division of the Medicine Bow Reserve.

It was found in the first place that the protective value of the forest as a cover for the watersheds is so great that any utilization of the timber crop must be subordinated to it. Throughout the region the control of streamflow by the forest cover is the prime consideration. The mining industry, which is of high importance, will not be hampered by the disposal of reserve timber, since all the mining claims located in or near the tract include timber sufficient for the needs of the owners. The present moderate grazing of cattle is carried on without risk to reproduction of the forest.

The Medicine Bow Forest Reserve contains the largest continuous body of lodgepole pine to be found in the Rocky Mountains. The timber on the tract for which the plan was made is accessible; tie cutting has been carried on in the reserve for some years; and it was definitely known that all the timber which could safely be removed would find sale. Measurements in the woods and careful studies of the rate of past growth and of the forest's power of self-renewal furnished data from which the government foresters calculated what the forest can be expected to yield and what per cent can be cut safely now. It was found that 165,000,000 feet B. M. of lodgepole

pine could be taken out and yet leave a large percentage for future crops. Special studies were made of the injury to which the forest is liable from insect attack and fungus, from wind-fall and fire. Local market conditions and the methods and cost of lumbering were investigated to see whether improvements and economies might not be instituted, as well as to fix upon a fair stumpage price.

The completed plan provides for better protection of the forest from fire, including effective measures for compact piling of debris and brush in openings ready for burning; stipulates

that all timber to be removed shall be marked in advance by the forest officers, who will be furnished with a full set of instructions to govern all steps in the logging operations; and requires that all merchantable parts of the trees be used.

Similar working plans will be prepared for available bodies of timber on other reserves, making possible the utilization of these vast forests under a system of scientific management which will perpetuate and improve the stand, and, above all, safeguard the forest cover on watersheds.

PUMPING WATER*

THE greater portion of water used in irrigation is diverted by gravity from flowing streams. While this is true as regards bulk of the water, yet as regards value it may be said that some of the most important sources of supply are utilized through pumping. In ancient times, especially in Egypt and India, where labor had little value and the conditions for diverting water by gravity were not favorable, pumping by hand or by animal power was largely in vogue.

In modern times the devices for hand pumping have been improved upon, although some of them are still utilized in crude form by pioneers in the arid region; but with ordinary farm wells irrigation is impracticable, other than the watering of a few trees or plats of vegetables; but the beginnings of irrigation on many a farm in the sub-humid region may be traced to successful experiments with water raised in this laborious manner.

The next step above human labor in pumping water has frequently been the utilization of horse-power. The

accompanying figure shows a simple device by which a horse walking in a circle causes a series of buckets to be lifted from the well, drawing up water sufficient for several acres. The possibility of irrigation in this way is limited largely by the depth of the water in the well and the number of animals available.

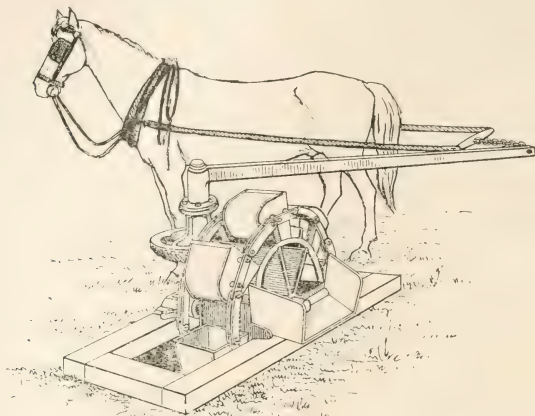
The next step is the use of the ordinary threshing engine, replacing the horse and driving a pump as shown in the accompanying sketch. Tracts of considerable size have been watered in this way, and the value of the crops greatly increased. For example, onions, which would have been almost worthless, owing to a drouth, have as the result of water properly applied sold at \$150 per acre, and celery at \$200 per acre, repaying in a season the whole outlay for well, pump and engine. Special forms of pumps driven by steam, gasoline, and other forms of engine, have been devised suited to the needs of the irrigator.

The most important source of power

*It is our intention to publish a series of articles on pumping, giving illustrations of the various kinds of engines, pumps and windmills employed in the different parts of the country, both east and west.—EDITOR.

for pumping is the wind. On the broad valleys and plains of the arid regions the wind movement is almost

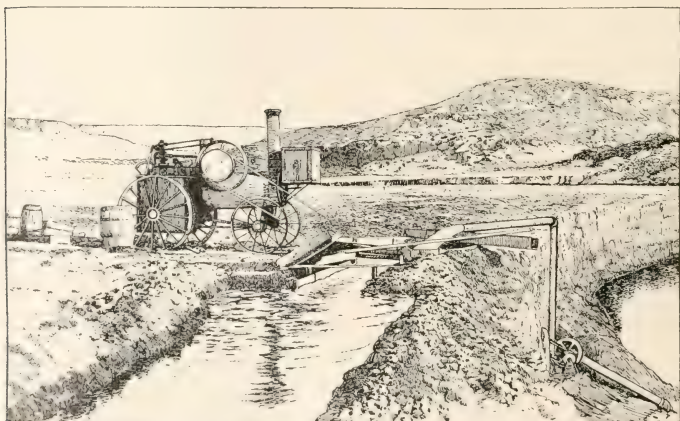
sweeping up the loose soil. In many localities there are at depths of 20 or 50 feet or more beneath the surface,



Pumping Water by Horse Power

continuous for days and weeks, carrying away the dry leaves, even at times

pervious beds of sand or gravel filled with waters by the infiltration or rain-



Pumping Water with a Threshing Engine

fall or by percolation from stream channels.

It is a comparatively simple and inexpensive operation to sink a well into this water and erect a windmill, attaching this to a suitable pump. The machinery once provided is operated day and night by the over-present wind, bringing to the surface a small, but continuous supply of water. This small stream, if turned out on the soil, would flow a short distance, then disappear into the thirsty ground, so that irrigation directly from a windmill is usually impracticable.

To overcome this difficulty, it has been necessary to provide small storage reservoirs or tanks built of earth, wood or iron to hold the water until

it has accumulated to a volume sufficient to permit of a stream of considerable size being taken out for irrigation. Such a stream flowing rapidly over the surface will penetrate to a distance and cover an area which would seem impossible with the small flow delivered by the pump.

The windmills employed in irrigation are of all kinds, from the highest type of the machinist's art down to the crude home-made devices. These latter are not to be despised, as many of them are highly effective, and at least they have enabled settlers to procure a small amount of water and to obtain a foothold upon the soil, by which ultimately they may be able to obtain funds to procure better implements.

NOTES ON FOREST TREES SUITABLE FOR PLANTING IN THE UNITED STATES

V—The Tulip Tree (*Liriodendron Tulipifera*)

DISTRIBUTION.

THE tulip tree (*Liriodendron tulipifera*) is distributed sparingly through southern New England and New York; it is more plentiful on the southern shore of Lake Erie and westward through northern Indiana and Illinois. To the southward it is found in Alabama and the other Gulf States to northern Florida. It is rare west of the Mississippi except in northeastern Arkansas and southeastern Missouri. It is most abundant and of largest size in the south central part of its range, especially in Tennessee, Kentucky, and the western Carolinas, and in the basin of the Ohio River and its tributaries.

The tree is hardy east of the Mississippi except in the colder portions of the Northern States, and thrives in a great variety of upland soils. The range for economic planting, broadly

stated, includes all of the states east of the Mississippi, although the conditions of soil and site in some localities make its development better than elsewhere. Near the western limits of its range it is sometimes injured by sun scald.

SOIL AND SITE.

The Tulip-tree is most common and attains its finest development on deep, fertile, rather moist loam, or rich sandy soil, in which is mixed a considerable quantity of humus. In the South and in the Ohio Valley the soil in which the largest and best Tulip-trees once grew is of great value for agricultural purposes; hence the forests of these regions have been destroyed and not replaced. The Tulip-tree will maintain itself in heavy clay and hard rocky soils, but such soils are not favorable to it and almost always cause a marked diminution in the characteristic devel-

opment of the species, especially in height growth and quality of the timber. The tree is found growing in exposed situations, but reaches greater size in sheltered ravines and valleys, and in protected coves along water courses. It is never found growing in standing water, but will endure very moist soil.

MANNER OF OCCURRENCE.

The Tulip-tree is scattered by single trees or clumps of trees throughout the forest. In specially favored localities in the South it is often the principal growth, but is not usually the predominant tree over extensive areas. In the North it occurs more sparingly than in the South. It is generally associated with other deciduous trees, such as Chestnut, the oaks, walnuts, hickories, maples, Black Cherry, Locust, and Beech. On the South Atlantic coastal plain it occurs with Sweet Gum, Black Cherry, Black Gum, Swamp Chestnut Oak, and Water Oak, or in peaty soils with the White Cedar (*Chamæcyparis thyoides*).

CHARACTERISTICS OF FORM AND GROWTH.

The growth of the Tulip-tree is rapid when compared with that of the hardwoods with which it grows; it is also long-lived, specimens having been cut 320 years old. During the first forty or fifty years the height growth is from 1 to 2 feet annually, with a diameter growth of one-tenth to one-fourth inch, or even more in favorable situations. Measurements made on sixteen trees averaging 28.1 inches showed an average rate of growth of 1 inch every six years. After passing fifty years, the rate of growth begins to decrease until it practically ceases when the tree is very old. The average height is from 70 to 100 feet, with a diameter of from 3 to 6 feet; but much larger trees are often found, some with a height of 190 feet and a diameter of 10 feet having been reported.

The Tulip-tree of the forest has a small pyramidal head held aloft by an exceptionally straight, cylindrical trunk, which in the forests of the Carolinas and Tennessee is often free from branches for 80 to 100 feet. The tree must have plenty of light; it will not endure dense shades, but when crowded often pushes its crown up above the trees around it. If too closely crowded and overtopped it is sure to succumb.

When grown in the open its form does not change so radically as does that of most other hardwoods under like conditions. Although the tree grown in the open is broader and more limby, the main axis is usually maintained and the limbs grow out symmetrically. The root system possesses both tap roots and a considerable development of the lateral roots. The tap roots make early transplanting rather difficult, but the young trees grow rapidly when once established.

THE WOOD—ITS ECONOMIC USES.

The wood is usually light, but varies in weight; it is soft, tough but not strong, of fine texture, and when well seasoned is durable in contact with the ground. It shrinks considerably but seasons without injury, and works and stands exceedingly well. The sapwood is thin, light in color, and decays rapidly. The wood is used for siding, paneling, interior finishing, and in the manufacture of toys, boxes, culinary woodenware, etc. With the diminution of the White Pine supply Tulip-tree is much used in its place. It makes a fair wood pulp, and is the tree from which most of our postal cards are made. The lumbermen recognize two kinds of Tulip timber, viz., white and yellow. The difference in color is caused mainly by the difference in site conditions. On dry, gravelly soil the wood produced is lighter in color, less durable, and harder to work, and is called "White Poplar." The "Yellow Poplar" is grown on rich alluvial or sandstone soil, where trees of mature age have little sapwood and

a rich, yellow heartwood, which is highly prized because of its fine grain and easy working qualities.

PROPAGATION.

Natural reproduction is fairly good on open land in Kentucky, Virginia, Maryland, and southern Pennsylvania. A forest growth may be maintained in these regions if proper care is taken in cutting to regenerate towards the prevailing wind, to leave seed trees in the cut-over area, and to break the surface soil so that it will form a favorable seed-bed. The seedlings which spring up in these moist open fields grow with surprising rapidity, often making a growth in height of 4 to 6 feet annually. Farther south, through Tennessee and the Carolinas, natural regeneration is rarely seen except occasionally in open pastures where the mineral soil has been freely exposed and there is plenty of light. The young seedlings cannot endure shade even to a limited extent. Sprouts grow from the stump, but should not be depended upon for reproduction. Seeds are produced in considerable numbers almost yearly, and the small percentage of perfect ones germinate freely if they fall upon a moist mineral soil. They will not start in a bed of pure humus. The seeds are borne in a cone-like fruit 1 to 2 inches long. The scales are really carpels, but only a few of the 50 to 60 in each cone are productive. Young trees are apt to produce seeds which are absolutely worthless, while on old trees only the highest limbs and the center carpels are productive of good seed.

Artificial propagation should be entirely by seeds. Where a forest growth has recently been removed from land which it is desired to reclothe with Tulip-tree, fair results may be attained by breaking the surface soil in the fall with a brush or harrow and sowing the seeds broadcast over the area.

Nursery culture and the use of carefully-grown seedlings or transplants is the surer but more expensive meth-

od of propagating the Tulip-tree. The seed should be collected in the fall when mature, and may be sown as soon as obtained or stratified in sand for spring planting. Fall stratification is advisable, since the seeds will then germinate the following spring; otherwise, if sown in the spring, they are very liable not to come up until the following spring.

The seed should be sown thickly in a bed of light, rich, sandy soil and covered to a depth of one-half inch. The bed should be kept evenly moist, with more moisture at first than later and should be completely shaded until the plants begin to appear. Subsequently there need be only partial protection, which is especially needed during the middle of the day, when the sun is hottest. Seedlings may stand in the seed-bed for from one to two years, but should not remain longer, because the tap root develops with but few lateral roots, which makes transplanting difficult. It thus becomes advisable to move the seedlings when one year old to nursery rows, which stimulates them to a vigorous development, insuring success in transplanting. Seedlings may be shifted nearly in the nursery until three or four years old, which causes a beneficial thickening of the root system, but such prolonged care is usually too expensive to be practical. If trees two years old or more are to be moved for the first time, it is often advisable to cut back the stem to the ground, taking care to move the roots intact; this will cause vigorous sprouts to spring up. Such practice is sometimes resorted to with younger seedlings.

Transplanting from the nursery to the permanent site may be done most successfully in the spring. Fall transplanting, although often fairly successful, usually gives a lower average of success than spring planting. The work should be done before the buds start, but may be attempted after the leaves are out if the stem be cut back in the way mentioned above.

When grown for forest purposes, the Tulip-tree should be mixed with other deciduous species, but should be given a start or planted with slow-growing trees so that it may not be overtopped. When planted for a ground cover or for economic purposes, the trees should be set about 6 feet apart each way. Within its range the Tulip-tree does not demand special preparation of the ground prior to planting, unless it be where there is an unusually tough sward, in which case the grass should be broken and turned under. In setting the trees the sod should be broken in a little circle and the tree set in the center of the broken ground, care being taken to pack the dirt firmly around the roots. The roots should never be allowed to become dry. If the plantation is in a sheltered valley or rich bottom land, the Tulip-tree may be planted as the predominant tree of the mixture. If it is in an exposed situation the species with which it grows should be in excess, so as to give the needed pro-

tection from high winds and frost. The desirable species for such a mixture include most of our moderately shade-enduring hardwoods, such as the maples, oaks, Chestnut, hickories, walnuts, etc. There seems no reason why the Norway Spruce and some of the pines would not also make desirable associate trees for the Tulip-tree.

POSSIBILITIES AND USES.

For shade and ornament the Tulip-tree possesses great merit and is deserving of very general propagation. It is to be especially recommended for cities where bituminous coal is burned. It comes into leaf early, holds its foliage until late in the fall, and has few disfiguring insect enemies, while in general shape and manner of growth it leaves little to be desired. Forest planting of the Tulip-tree for economic purposes has never been attempted, but judging from the form and rate of growth of the natural forest-grown tree, and the value of the wood, few trees would be more profitable for such a purpose.

RECENT PUBLICATIONS

Post's Paper Mill Directory for 1905-6. Pp. 571. L. D. Post, Publisher, New York, 1905. \$2.00.

The latest edition of this standard directory is probably the most comprehensive and inclusive list of manufacturers, dealers, mills, and mill officers of the paper, pulp, and chemical industry of the United States and Canada extant. Classification is made of mills by their goods, a list of projected mills given, and a very complete directory of foreign mills included. The mass of information which the volume contains is arranged in a manner that makes it easy of reference, and a complete index makes all information immediately "get-at-able." To the pulp and paper trade this volume should prove indispensable.

Fifth Annual Report of the Indiana State Board of Forestry, 1905. Pp. 245, illustrated. State Printer, Indianapolis, 1906.

The Indiana State Board of Forestry prefaces its annual report with the gratifying statement: "There is at this time a strong sentiment favorably inclining to the institution of stronger forestry methods in almost every community within the State.

The Board finds on every hand interested men and women of clear conceptions and advanced ideas of the forestry problem, and who are rendering assistance by both word and action." The report is unusually interesting and contains much information as to the forest situation in Indiana, and directions as to the trees most suited to the State, methods of planting, injurious forest insects, etc.

The Improvement of Columbia, South Carolina. Report by Kelsey & Guild. Pp. 88, illustrated.

The interesting pamphlet here presented is a report by Messrs. Kelsey and Guild, landscape architects, to the Civic League of Columbia, S. C., including suggestions for the civic improvement and beautification of that city. The report embraces a broad and comprehensive plan of treatment, extension and improvement of park systems, street tree planting, etc. A plea is made for civic beauty, for the obliteration of unsightly public nuisances, and the institution of such reforms as will reflect the best life and character of the people. The directions as to what particular species of trees are desirable for planting, their care, etc., are of particular interest.

Forestry and Irrigation

H. M. SUTER, Editor

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WORK ON SALT RIVER PROJECT, ARIZONA - *Frontispiece*

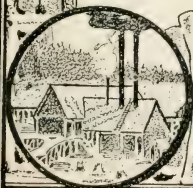
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Former Apache Warriors now Earning their Living by Irrigation Work and Road Making in Connection with the Salt River Project, Arizona

FORESTRY AND IRRIGATION

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No. 5

NEWS AND NOTES

Favorable Report

To the many persons desiring the establishment of federal forest reserves in the Southern Appalachians and the White Mountains, it will come as most welcome news that the Committee on Agriculture of the House of Representatives has decided to make a favorable report on the bill creating these reserves. The Senate Committee having in charge a like bill sometime ago made a favorable report. While no further action may be expected at the present session of Congress, the matter is now in excellent shape for forcing it at the opening of the new session next fall.

Hearing on Revised Bill

In this connection we wish to call attention to the notable hearing on this bill, April 25 and 26, before the Committee on Agriculture of the House of Representatives.

The American Forestry Association, together with several of the State organizations, has been earnestly working to secure the passage by Congress of this measure, or similar ones, for a number of years. When the date of the hearing on the latest measure was announced by the House Committee, it was decided to make a strong plea before that Committee for the re-

serves, substantiated by convincing evidence of the pressing need for action. At a forestry meeting held at Charlotte, N. C., early in March, Governor R. B. Glenn, of North Carolina, was asked, in a resolution, to request the Governors of all States interested in the reserves, to appoint a committee of five citizens to represent their respective States at the hearing, and present individual evidence of the need of the reserves, and voice the general desire of the people. Accordingly, at the hearing on April 25 and 26, there were present some seventy-five persons, representing, in all, fourteen States, and including the Governor of North Carolina, and the Governor of New Hampshire—the latter, accompanied by his entire council. Governor Glenn, as chairman of the assembled committees, was in charge of the presentation of evidence to the House Committee.

The first day's session was opened with a forceful address by Governor McLane of New Hampshire, on the subject: "The States within which these proposed forest reserves are to be located cannot be reasonably expected to establish and maintain forest reserves which are for the benefit of the entire eastern half of the United States, and the nation as a whole."

Governor McLane was followed by Mr. Theophilus Parsons, of Boston, chairman of the Massachusetts delegation, who spoke on the manufacturing interests and water powers as affected by the forest reserve problem, particularly in New England. As a representative from the South, Major Augustine T. Smythe, of Charleston, S. C., spoke along the same lines, presenting much valuable information as regards the depreciation in values of water powers as a direct result of the cutting of timber. The effect of the denudation of the forests on the navigation interests was discussed by Mr. C. C. Goodrich, General Manager of the Hartford and New York Transportation Company, Hartford, Conn., speaking for New England, and Prof. L. C. Glenn, of Vanderbilt University, Nashville, Tenn., on the part of the South. Dr. Eugene Allen Smith, State Geologist of Alabama, also touched on this subject and the extent of the damage wrought to the shipping interests of the South. Prof. J. H. Stewart, Director of the Agricultural Experiment Station, Morgantown, W. Va., explained the interest of the farmer in the proposed Southern reserve.

Rev. Edward Everett Hale, Chaplain of the Senate, and a pioneer in the movement for the White Mountain Reserve, made the opening speech of the second day's session, on April 26. Agricultural Commissioner E. J. Watson, of South Carolina, was called upon to explain the relation of agriculture to forestry, and to discuss the effect of forest denudation upon agricultural prosperity. Mr. Harvey N. Sheppard, of Boston, representing the Appalachian Mountain Club, urged, in a brilliant address, the creation of the reserves as a breathing space for the crowded inhabitants of the thickly settled East. Governor R. B. Glenn closed the arguments in an eloquent appeal for prompt action.

The hearing in its entirety was a remarkable one. There has seldom been called together for a like purpose—viz., to plead for action by Congress on any measure—a set of men speaking for

so many varied interests, and representing so much invested capital in the industries which have in a large measure brought America to the front as a producing nation.

As matters now stand for the action in Congress on the bill for these reserves cannot be had before the next session. But meantime the many friends of the measure should continue actively at work in creating sentiment favorable to its passage. It is only the strongly expressed wish of the people that will bring final and favorable action. Much headway was made the past twelve months, and at no time since the beginning of this movement has the outlook for success been so bright.

Forest Service According to such a high
Lumber technical authority as
Statistics the *Mississippi Valley*

Lumbermen: "The first report of lumber statistics gathered by the Forest Service of the Department of Agriculture, and presented at the annual meeting of the National Lumber Manufacturers' Association, at St. Louis, though admittedly incomplete, makes so good a showing as to warrant the belief that this section of Government work will become immensely valuable during coming years." It further comments as follows: "Those who have, in the past, attempted to gather statistics of this character from a comparatively small area of country know the difficulties that must be overcome even where the compilers have personal knowledge of the business and personal acquaintance with a very large proportion of those from whom the information must be obtained. Errors of commission and errors of omission have not been missing from the statistics compiled by the lumber trade journals that have been engaged in this class of work for more than a quarter of a century. Persistent effort in the form of second, third and fourth requests have failed to bring reports from many manufacturers, and after an almost complete degree of accuracy was reached in the Northern pine statistics, the manufac-

turers suddenly decided that no more detailed figures would be available for publication.

"For the purpose for which these statistics were intended—to inform the readers of the trade journals not only the amount of available stock, but where it could be found, as well—a generalization or grouping of totals did not answer, so, from that point of view, the statistics given out by the Forest Service are not especially valuable. They are valuable, however, as affording information of the extent of the lumber industry, the distribution of the various woods that enter into lumber commerce, and the rapidity with which the timber resources of the land are being exploited. In the table published in the report of the St. Louis meeting, the Forest Service estimates that from seventy to eighty per cent of the total lumber cut is represented. The totals were a little short of 27,000,000,000 feet, indicating that the total cut of the country was between 35 and 40 billion feet of lumber. But these figures are only a part of the work that has been undertaken by the Forest Service in co-operation with the National Lumber Manufacturer's Association, and it is only in connection with the other work that they attain their greatest value. It is the aim of the Service to obtain figures of the total timber resources of the country, the increase by growth and the total drain upon those resources. When all this information is secured with a fair degree of accuracy, it will be both valuable and interesting."

Forestry in Canada

The recently issued report of the superintendent of forestry for the Dominion of Canada, for the fiscal year ended June 30, 1905, contains some interesting information regarding the progress of forestry in Canada. Superintendent Stewart points out the great difference in forest conditions between the countries of the Old and New World, and states his conviction that European methods are not en-

tirely practicable in Canada. The report emphasizes the necessity of trained foresters in the Dominion, and advocates educational advantages in forestry. Strong emphasis is laid upon the necessity for adequate fire protection. The fire ranging system, which has been put into operation in some districts with considerable success, is described.

The importance of proper cutting is emphasized by Superintendent Stewart, as second only to fire protection. Forest reserves have already been created in the Dominion, but only for two reservations have working plans been instituted.

The distribution of seedling trees for forest planting, to settlers in the Northwest—a co-operation system, which was begun in 1901—is already assuming vast proportions. Some 1,860,000 were distributed during the year.

Forest Fires An unusually dry spring has made conditions for forest fires peculiarly favorable in the Northwest. Close to Vancouver, B. C., fires of considerable magnitude have destroyed much valuable timber, and a fire in Lynn Valley destroyed hundreds of cords of wood and shingle bolts belonging to the Hastings Shingle Manufacturing Company. The mining town of Berlin, Wash., was almost completely destroyed, and along the Great Northern and Northern Pacific railways forest fires have kept firefighters at work. Skyomish and Monroe, Wash., were for a time seriously threatened, previous to a heavy rainfall. Owing to the failure of the Washington Legislature to provide sufficient funds to carry on the work of fire fighting beyond last year, the timber owners, headed by the Weyerhaeuser syndicate, are providing a fund, and wardens will be placed in the field to organize volunteer crews, where fires are discovered.

The most serious damage caused by forest fires so far this season, has been done in the upper peninsular of



Tallulah Falls, Georgia.

There is here a succession of beautiful cascades which have within a short distance an aggregate descent of 335 feet, within the boundaries of the proposed Southern Appalachian Forest Reserve.

Michigan and northern Wisconsin, where reports indicate 200 square miles are affected. Newspaper reports from Escanaba and Gladstone, Mich., state that the towns of Saunders, Quinnesec, Shafter, Ralps, Salvoie, Cornell, Woodlawn, and Talbot have been completely destroyed, and several other towns seriously threatened. The exact loss is hard to estimate, on account of the meager details, but the loss in timber alone will be considerable, while the damage to farms, homes, live stock, and real estate will be very heavy.

Chair of Lumbering At the meeting of the National Wholesale Lumber Dealers Association, held at Chicago in May, 1905, a resolution was adopted to secure funds for the endowment of a chair of applied forestry and practical lumbering at the Yale Forest School. A committee was appointed to have charge of raising the fund.

At the annual meeting of the association, held recently in St. Louis, Mr. F. E. Weyerhaeuser reported for the committee the progress of its work. Some difficulty was encountered in getting the work under way, owing to the large territory to be covered. Accordingly it was January of the present year before the committee undertook the active work of soliciting subscriptions. Since that time, however, the work has gone steadily forward and \$54,601.20 has been raised through 158 subscriptions, from the following sources:

Arizona District.....	5	\$	80.00
Lumber trade journals.....	1		100.00
Pacific Coast Lumber Manufacturers' Association.....	1		500.00
Pennsylvania State.....	1		1,000.00
New York State.....	1		1,000.00
Michigan State.....	3		1,250.00
Sugar Pine Manufacturers.....	2		1,250.00
Southern Cypress Manufacturers' Association.....	19		2,175.00
National Wholesale Lumber Dealers' Association.....	43		4,350.00
Northern Pine Manufacturers' Association.....	18		19,200.00
Yellow Pine Manufacturers' Association.....	48		20,446.20
Hardwood Manufacturers' Association of the United States.....	16		3,050.00
	158		\$54,601.20

The members of the committee having this matter in charge are Messrs. William Carson, J. T. Barber, J. B. White, C. I. Mallard, N. W. McLeod, E. G. Griggs, R. A. Long, R. H. Downman, I. C. Enochs, J. L. Kaul, and F. E. Weyerhaeuser. Mr. George K. Smith is secretary of the committee.

New Hampshire Meeting

The annual meeting of the Society for the Protection of New Hampshire Forests was held at Concord, N. H., on May 9. The meeting was an unusually interesting one. Mr. Asa F. Williams, forester of the Berlin Mills Company, addressed the meeting on the subject, "The Influence of Logging Upon Natural Reforestation." In addition there were papers by Prof. F. William Rane, of the Department of Horticulture and Forestry, of the State Agricultural College at Durham; Mr. Edwin A. Start, secretary of the Massachusetts Forestry Association; Hon. Henry F. Hollis, of Concord (who has recently planted ten acres of white pine), and others. Dr. A. D. Hopkins, forest entomologist of the Department of Agriculture, spoke on "Insects Injurious to the Forests of New England," illustrating his talk with lantern slides.

A legacy of \$5,000, left by Mrs. Julia B. Thayer, of Keene, N. H., was announced; also that Dartmouth College has placed its large tract of 26,000 acres under forest management in co-operation with the society, with the Forester, Mr. Philip W. Ayres, in charge. There were full reports upon the proposed forest reservations in the southern Appalachian and White Mountain regions, and the society expressed its hearty appreciation for the efforts that have been made looking to their establishment by the Senators from New Hampshire, by Dr. Edward Everett Hale, and by Governor R. B. Glenn, of North Carolina. Governor Glenn was elected a vice president of the society, Dr. Hale already being an honorary life member. The society has selected a list of correspondents in the several states of the Union to

assist in the campaign for national forest reservations in the East.

At this meeting action was taken looking toward closer affiliation with the American Forestry Association, viz., the society voted to become a sustaining member, which, under the amended by-laws adopted at the last meeting of the American Forestry Association, allows an organization joining in such a manner the privilege of representation on the advisory board of the association, one member of which is also elected a vice president of the American Forestry Association. Those, who will represent the Society for the Protection of New Hampshire Forests on the advisory board of the association, are Hon. Frank W. Rollins, Concord, N. H., president of the society; Mr. George T. Cruft, Bethlehem, president of the White Mountain Board of Trade, and treasurer of the society, and Mr. Philip W. Ayres, Concord, forester of the society.

To Enforce Order in Camps The initiation of a large national irrigation project, giving employment to hundreds of laborers, is almost always followed by an influx of disreputable characters who attempt to establish themselves in or near the construction camps. They are most objectionable individuals and their purpose is to establish saloons, brothels and gambling houses. Their presence in the camps is invariably followed by a saturnalia of crime, drunkenness, robberies and murders.

In many states laws have been enacted prohibiting the establishment of saloons within a specified distance of

any government works under construction; but in others apparently this important matter has been overlooked, and the engineer is helpless to protect the laborers from being wantonly robbed and frequently murdered. Even in states which have enacted these laws great difficulty is experienced in prosecuting the violators owing to political influence which the liquor element is able to bring to bear on state and county authorities. The processes of the law are so slow that the liquor sellers and gamblers openly boast they can delay proceedings against them until the works are completed, after which they are willing to give up their unlawful pursuits and abandon the temporary buildings occupied by them.

In Nevada the conditions at several points along the works became deplorable. The laborers, intoxicated by the vile decoctions of the dram shops, have been robbed by the gamblers or highwaymen and murders have not been infrequent. Several lynchings have occurred when the hold-up artists have been taken red-handed by the infuriated laborers.

The Department of Justice has been called upon to assist the Reclamation Service in driving out these criminals and in keeping liquor off the government reservation and out of government camps. Thus far repressory measures have proved unavailing, owing to the impossibility of securing prompt action in local courts. It is hoped that with the co-operation of the Department of Justice the reign of lawlessness on several of the government works may be ended and some of the rascals punished.



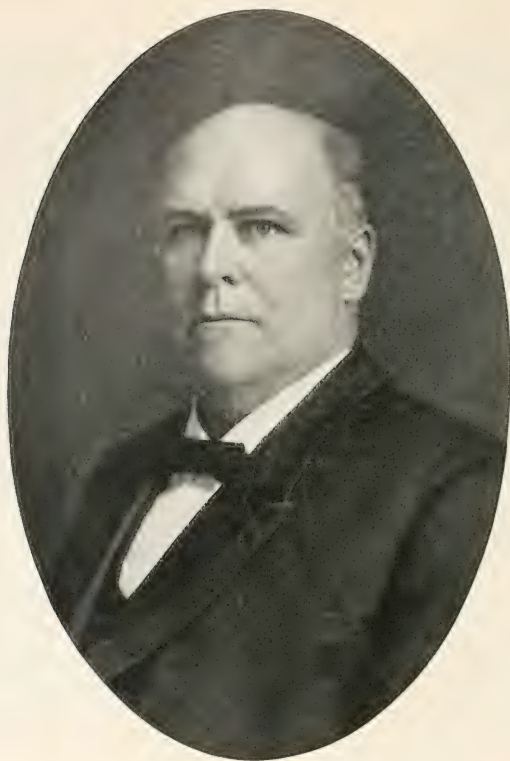
Bristow Adams.



GOVERNOR JOHN McLANE OF NEW HAMPSHIRE

ONE OF the most forceful of the addresses given before the Committee on Agriculture, of the House of Representatives, at the time of the recent hearing on the bill for the creation of national forest reserves in the White Mountains of New Hampshire and the Southern Appalachian Mountains, was that delivered by Governor John McLane, of New Hampshire. So vitally does the government of the State of New Hampshire, in which the proposed White Mountain Reservation is located, feel the need of this reservation, that it was unanimously voted that the Governor and his council should attend the hearing before the House Committee and exert all possible influence toward securing the reservation.

John McLane was born at Lennoxtonn, Scotland, February 27, 1852. He was educated in the public schools at Manchester, N. H., and learned the trade of cabinet maker, and since 1876 has been engaged as a manufacturer of postoffice furniture and equipments. He is now President of the McLane Manufacturing Company; also President of the Lonhegan National Bank, and variously connected with other institutions in his State. He was a member of the New Hampshire House of Representatives, 1885; State Senator, 1891-3, and President of the Senate at both sessions. He was elected Governor in 1905.



GOVERNOR R. B. GLENN OF NORTH CAROLINA

SELDOM has forestry found a more ardent and enthusiastic advocate than Governor Robert Brodnax Glenn of North Carolina. Among the first in North Carolina to discern the value of forestry to his State, and appreciating the vast interests at stake, he has ardently championed the cause and by the force of his example and his unflagging interest gained the support of all substantial citizens. Just now the State is beginning to awake to its needs and to realize more fully the magnitude of its interests involved through destruction of the forests, and the many advantages to be derived from the proposed Appalachian Forest Reserve. Governor Glenn's prompt and intelligent support of the forest movement is characteristic of his work in other lines.

Robert Brodnax Glenn was born in Rockingham County, North Carolina, August 11, 1854, the son of Chalmers L. and Annie S. Glenn. He received education through a tutor at home, later attending the high school at Leaksville, N. C., Davidson's College, N. C., and finally Pearson's Law School at Richmond Hill, N. C. Upon completing his course at the latter school he engaged in the general practice of law, and since 1878 has been a member of the firm of Glenn, Moody and Hendren, at Winston, N. C. He has been assistant director for the Southern Railway, attorney for the Western Union Telegraph Company, member of the State Legislature (1881), solicitor for the State of North Carolina (1886), and district attorney for the United States, 1893-97. He was elected Governor of North Carolina in 1905.

THE DRAINAGE OF THE EVERGLADES

BY

DR. JOHN GIFFORD

A PROPOS of the Steenerson bill for the reclamation of swamp-lands, I believe, although I have no statistics at hand, that the area of good land under cultivation in the United States which has been reclaimed by drainage, equals or exceeds that reclaimed by irrigation; and the same applies to the amount of land still unreclaimed. Our largest swamp areas are still wildernesses because their very vastness renders reclamation by private enterprise impossible. It is, however, undoubtedly quite as much the function of the federal government to remove water from land in the east as it is to put water on the land in the west.

The vast swamp area known as the Everglades in the part of Florida which is tropical is of such size that private enterprise cannot handle it and it is doubtful even if the State of Florida is equal to it. It is a project of such magnitude that in order to be done properly, federal aid is necessary. It is a pet project of the present Governor of Florida and the work of reclamation has actually been begun both by the State and the Florida East Coast Railroad. These operations, however, compared with what there is to do are like the merest nibblings on the edge of an enormous cheese. The reclamation of the Everglades deserves attention from federal authorities, firstly, because a large part of it is still unsurveyed federal land, and, secondly, because it is capable of producing a great variety of crops at a time of the year when they cannot be produced elsewhere in the United States. Almost every year an enormous quantity of winter vegetables is produced on the edge of the Everglades. The rainfall was exceptional this year, how-

ever, so that glade crops were impossible. The excessive and unusual amount of water has rendered trips by canoe into the Everglades possible this winter.

The writer with a party of friends took advantage of this opportunity to visit Seminole village on one of the islands in the Everglades.

The Everglades are, in part at least, surrounded by a rocky rim. This rim is mostly limestone rock. Here and there streams break through the rim, and thus the region is drained. In dry times the flow from the streams and the evaporation are sufficient to keep a large zone on the edge of the Everglades comparatively dry and fit for cultivation. In the saucer-like depression within the rocky rim there are immense springs which are fed from some inexhaustible source far up the country. When excessive precipitation is added to this spring supply the rocky water courses flowing into the sea are unable to carry off the water and the water-table which is ordinarily close to the surface is raised so far above it that navigation with a canoe is comparatively easy. One can follow for miles the trail of the Seminole canoes through the saw-grass.

The rocky, pine-covered land occasionally juts into the marshes like fingers, and vice versa long slender minor glades run into the pine land.

Here and there throughout the Everglades are islands which are entirely different from the pine land. On these islands the Seminole Indian lives and cultivates his crops. In the marshes he hunts alligators and other wild animals. The islands are rocky just like the pine land rim, in fact the whole of the Everglade region is un-

derlain with limestone rock, sometimes close to the surface, even exposed to view, while in other places it is covered with several feet of partly decomposed vegetation.

On these islands we recognized several familiar trees, such as *Magnolia glauca*, so common in the south and seen as far north as Long Island, the cypress, the live oak and the cocoaplum, mingled with such unusual trees as the wild calabash (*C. ovata*), etc. Here the Indians make their clearings and grow sweet potatoes, squashes,

The Seminoles are much like other people in that some are clean, some are dirty, some industrious, some lazy; most of them fond of liquor and tobacco; fond of finery and plenty to eat, but they are peculiar in that they apparently have no political status. Although they were driven into this land and sought refuge here, they have no legal claim to it. They are neither citizens nor are they wards of the government. They have their own laws and do as they please. While peaceful they are never molested. The



Looking into the Everglades. One of the streams by which they are partly drained.

corn, etc. Here also are limes, rough lemon, sour orange, and other trees planted by the Indians.

When one tries to land on one of these islands, the centre of which has been cleared mainly by girdling and fire, he realizes why the Seminole wears no pants. The water through which one must wade to approach the farm was waist deep this winter. The wetting did not concern us as much as did the thought of mocasins which frequent such places.

time is coming when these islands will be needed for truck patches. The most successful grower in Dade County, Florida, this season raised his crops on one of these islands. He is already clearing another. Additional islands are owned, and still other persons have their eyes on getting islands, and so on it will go until they are all used. Strange to say in order to grow truck successfully here, one must irrigate. The truck grower referred to above owns a long slender island. Down the

middle of it winds a square trough of cypress boards. In the sides of this trough are holes; with a six-horse-power gasoline engine he pumps the water out of the Everglades and lets it out of the holes in the trough when and wherever he needs it.

The rocky bed underlying the soil covering of the Everglades is apparently still in process of formation. The water as it comes from springs is full of lime. Owing to evaporation and chemical reasons the lime is de-

Mangrove Swamp. These mangroves are often large, fine trees and when accessible are being used for piling. A small quantity has been used for flooring and the bark is being shipped from this region for tanning extract. The black mangrove is also a valuable tree.

The main point of this article, however, is this: If Congress is hunting for swamps to drain they are here. There are four or five million acres of them. Here is opportunity for tropical



Indians coming out of the Everglades in their canoes on the Miami River.

posited on everything. Every leaf and twig is covered with it. Over the surface innumerable shells of snails may be seen floating. These finally drop to the bottom and are incorporated with the rock.

In the southern part of the Everglades there is an island called "Paradise Key," on which there are many large royal palms. How they got there is a mystery.

South of the Everglades stretching for miles to Cape Sable is the Great

expansion nearer home than the Philippines. Here is an empire to conquer which reminds the forester somewhat of the famous "Landes" which are now reclaimed and one of the most healthful and productive provinces of France. But, strange to say, the Everglades are not unhealthy. In fact the Indians claim that mosquitos are fewer there than in the dry pine land. This is probably due to the little fish that live in its streams. In general, animal life does not appear to be plentiful in

these glades. Two or three hundred Indians, born hunters, constantly hunting can keep the fish and game animals in check over a broad area.

No doubt when ditches are dug tourists will tour these glades with comfort, just as they will in the course of a

he regarded the building of this railroad second only in importance to the Panama Canal project. It would seem that if private enterprise is capable of building a railroad across the Florida Keys to Key West it might also be equal to the task of draining the Ever-



A Group of Seminole Indians who inhabit the Everglades

year or two cross the Keys to Key West, literally go to sea by train with the Straits of Florida on one side and the broad Gulf of Mexico on the other. The local papers report that Mr. Shonts, of the Canal Commission, while in Key West recently, said that

glades. Many of the canals which would be dug in the Everglades would serve at the same time for transportation purposes.

While land is so abundant and cheap even near the great centers of population the need for the reclamation of

vast swamp areas might, however, seem questionable. It is people that are needed more than land. At the same time this swamp land is highly productive so that in the long run its reclamation pays. Swamp lands lie idle at the very doors of our great

As Merriam points out in his bulletin on Life and Crop Zones, when a zone of one kind dips far into a zone of another kind there is great advantage. In the Everglades region we have a vast territory of humid tropical land extending northward so close to



A Boatload of Alligator Eggs. In the center of the boat there are young Alligators just hatched.

cities. In Holland land is wrested from the sea while close by there is plenty of poor, cheap land to be had. The writer once visited a bleak health-land tract in Holland, called "Amerika," where a company was endeavoring to induce settlers to come and start a boom.

great centres of consumption that its ability to produce unusually crops will some day be recognized.

There have been objections advanced to this old reclamation project. It is claimed on the East Coast that the lowering of the water table in the Everglades will remove the influence

which such a body of water exerts on tempering the northerly which blow across it. There may be something in this objection but opinions are so diverse on the subject that it is impossible to conjecture its effects. In case frosts are more severe after the drainage is completed the drainage would be blamed although the frost might really be due to other causes. The planting of trees over this area which would immediately follow its drainage would probably more than counteract the influence of the drainage. Since the water in the 'Glades comes mostly from deep springs it is warmer in cold weather and cooler in warm weather than the air.

It is the original cost of such projects which stagger one, but operations just as great have been completed or are in process of construction. When the Panama Canal is done and in working order we will regard it as a matter of course and wonder why some nation had not done it long ago. The great Gulf trade now all goes around the south of Florida and when one sees ship after ship loaded with valuable cargoes piled up hopeless wrecks on the Florida Keys with millions of dollars worth of human labor lost he realizes that a canal from Jacksonville to the Gulf in a saving also of coal and time, would in the long run prove a great investment.

So when one sees thousands of farmers working in poor sandy soil, which ought to be left to produce forest, he wishes that they might have some of the unreclaimed swampland which they are prevented from using in consequence of the great initial cost.

It is an indisputable fact that land which is easy to clear is usually cleared first and that lands which have been reclaimed by drainage and irrigation are really the lands which have the most lasting fertility and the greater productiveness. When we consider the smallness of the return and the loss of time and labor in working poor land over a period of many years the first cost after all counts for little. The man who pays five dollars an acre for poor land because he cannot afford to

pay one hundred for good land is making poor investment.

One must beware drained lands which may be subject to flood in severe storms. On our eastern coast of the United States there are hundreds of acres of banked lands once carefully cultivated now swamp again. Drainage must be perfect to meet extreme conditions of storm. This means great and lasting works on a large scale similar to those of Holland.

The Everglades are higher than the sea. There is no danger of floods except from excessive precipitation. The water is constantly coming up from below. It is merely a matter of ditches. And ditches are merely a matter of money, men, and machinery. That work has begun is evidenced by the following note clipped from the *Miami Metropolis*:

"Information has reached the city that the dredge under construction at Fort Lauderdale for the State, to be used in digging a canal to drain the Everglades, as proposed by Governor Broward and the State Drainage Commission, was successfully launched on Monday, and will at once be fitted with the machinery, all of which is on hand, and the craft made ready to begin dredging operations within a month.

"The hull of the dredge is 50x112 feet in size, and it is said the machinery to be installed will have a greater capacity than any similar dredge ever constructed in the State. Governor Broward will come down again and be present when the craft is put to work on the project which is just now agitating and interesting the State."

But the Drainage Commission has ordered the special drainage tax to be severed from this year's collections until pending litigation has been settled. This means the suspension of the "Everglade scheme" for the present at least, though there is apparently nothing to prohibit Governor Broward from continuing the work of building dredges with the money already on hand in the Internal Improvement Fund.

BLACK CHERRY (*Prunus Serotina*)*

VI.—Notes on Forest Trees Suitable for Planting in the United States.

DISTRIBUTION AND MANNER OF OCCURRENCE.

The Black Cherry flourishes throughout the eastern half of the United States from Nova Scotia to Tampa Bay, Florida; westward it grows to the Missouri River in southeastern South Dakota, to eastern Kansas and Nebraska, Indian Territory, and Texas; and extends through Mexico and along the Pacific Coast of Central America to Peru. In the northern extremity of the Lake States its distribution is limited to shaded lake shores and banks of streams, while in places it fades out entirely and is replaced by the Wild Cherry.

Although growing over a wide range of territory, the region for economic planting should be limited to the region extending westward from Indiana to eastern South Dakota, and Kansas, and southward along the high moist slopes of the Appalachians.

Throughout its range it is common under varying conditions of soil and exposure in open places in hardwood forests, but is nowhere abundant, though occasionally in the most favorable locations numerous groups of trees are found.

CHARACTERISTICS OF GROWTH—ASSOCIATE SPECIES.

Because of its adaptability to different conditions the Black Cherry varies greatly in form and size, depending on the region and locality in which it grows. In New England it is of medium size, 30 to 50 feet in height, with a diameter varying from 10 inches to 2 feet. In the Middle States and westward it becomes larger, with a height of 40 to 70 feet, and with sometimes a diameter of 3 feet, although it becomes smaller along the northern limit of its

range. In the moist residual soil of the upper slopes of the southern Alleghenies it reaches its maximum growth; here a height of 100 feet and a diameter of 5 feet is often attained.

When forest-grown the trunk of the Black Cherry is long and slender, free from branches, and surmounted by a comparatively small, open crown composed of large, irregular branches. In the open the crown becomes more spreading, but seldom massive like that of the oak and chestnut. The root system is extensive, especially on dry, sterile soil, where the heart roots go deep in search of moisture. A considerable lateral system of surface roots is also developed. The tree is moderately shade-enduring.

The rate of growth is so much dependent upon climate and soil conditions as to cause different opinions concerning its real capabilities. Under the most favorable conditions it is a rapid growing tree, while in a very cold or exceedingly warm climate, and in unfavorable soil, the growth is rather slow. In a deep, rich soil and a mild climate, trees 25 to 30 years old have been known to make an average annual diameter growth of four-fifths of an inch, but the valuable, dark-colored timber is not produced until the age of 60 to 80 years. On the whole, the Black Cherry may be considered as a rapid-growing, short-lived species.

The trees associated with the Black Cherry include nearly all of the common hardwoods, among which may be mentioned the Beech, birches, oaks, hickories, Black Walnut, Ohio Buckeye, and the maples.

WOOD—ECONOMIC USES.

The wood is light, strong, rather hard, with a close, fine grain which

*Furnished by U. S. Forest Service.

takes a beautiful polish; it is brown or red in color at maturity, with thin, yellow sapwood. It is suitable for cabinetmaking and interior decorating, and for such purposes has been so extensively used that the largest and best trees of the country have now been cut. For general construction work or when exposed to the weather the wood is not good. This lessens the value of the tree for general planting.

SOIL AND SITE.

The Black Cherry is capable of existing in a variety of dry situations, but it is only in the moist, well-drained, rich soils of mild climates that the maximum development is attained. The tree thrives on bottom lands and does fairly well on sandy or rocky uplands if the soil is rich and penetrable. In the West its success as a forest tree has been variable, although on the whole encouraging. In the loess soil of western Iowa, on dry ridges and bluffs, and in black drift soils it makes a rapid growth.

PROPAGATION.

Birds are the natural agents of seed dissemination for the cherry, and by them the tree has been broadly distributed. This means of starting reproduction can hardly be depended upon, however, because the cherry pits are scattered too thinly and many of them are lost through falling in places unfavorable to germination. On limited areas in the South natural reproduction is good on open or partly shaded land, but in the North and West it is often lacking.

As the Black Cherry is easily transplanted, it is better to plant the seeds in a nursery and transfer the trees to the final forest site when one or two years old than to attempt to grow young trees by planting seeds where the trees are to stand.

The fruit, which is borne profusely almost every year by trees in the open and less frequently by those in the forest, ripens in late August or early September and may be collected by hand from low trees or from tall forest

trees by shaking it down upon canvas. The pulp should be washed off and the surface of the pit dried to prevent moulding. For winter preservation the pits should be stratified in moist sand and placed on the north side of a building where they will breeze and not be thawed out too often or too rapidly by the sun. In the spring they should be planted in drills 8 to 12 inches apart for hand cultivation, or 2 to 3 feet apart if a horse cultivator is to be used, and covered about 1 inch deep. In the drill the seeds should be placed 2 or 3 inches apart. Planting must be done immediately after removing the pits from the sand, as even a partial drying at this stage is fatal. The transfer to the permanent plantation may be made in the spring when the trees are 1 year old, or they may be transplanted to nursery rows and allowed to develop for another year before the final setting.

The Black Cherry, since it endures considerable shade, may be planted rather close, either in pure stands or with associated species. The best species for a mixture are Boxelder, Red Oak, ash, elm, Silver Maple, Black Walnut, and Hackberry, the choice depending upon the locality.

ENEMIES.

The forest tent caterpillar (*Clisio-campa americana*) often seriously injures the Black Cherry by destroying the leaves. A fungus known as "black knot," by causing unsightly swellings on the branches, greatly disfigures the tree. In case of insect attack specimens should be sent to the Division of Entomology for identification and suggestions as to methods of control.

The leaves and fruit of Black Cherry contain hydrocyanic acid, which is a deadly poison; cattle have in rare instances been poisoned by eating the leaves, and it is said that children have died from eating the pits or swallowing the fruit whole. The fresh leaves are considered harmless, the poison being the result of chemical action in the withering leaves.

POSSIBILITIES AND USES.

For limited use as a mixture in prairie planting, especially on rather moist soil, the Black Cherry will find a useful place. In general, however, it is too short lived and of too limited economic value to be recommended for extensive planting in the West. As a nurse tree in forest plantations and where a luxurious foliage effect is desired it serves a useful purpose.

In the South and East, where it is of longer life and reaches its best development, it does not hold a high place because of the small size of the timber it produces and the presence of more valuable species. It is seldom used for ornamental purposes. With slight protection near the seacoast it has in a moderate degree shown its ability to withstand salt winds.

NOTABLE PLANTATIONS.

H. C. Raymond, of western Iowa, reports that 10-year-old Black Cherry grown in groves is 6 inches in diameter and 28 feet high, while Hardy Catalpa of the same age and in the same soil is of the same diameter but only 25 feet high.

In the Farlington plantation in Kansas the Black Cherry for the first few years gave great promise, but it is now deteriorating and, in many cases, dying.

In a block planted in 1878, containing 196 White Ash, 27 Catalpa, and 7 Black Cherry trees, the Cherry, when measured in 1901, was the largest both in diameter and height. The following was the average size of the 7 trees:

Average diameter at 1 foot from the ground	8.4 inches
Average diameter at 7 feet from the ground	6.4 inches
Average height.....	34.0 feet
Average clear length of bole..	19.9 feet

In another block containing 149 Black Cherry and 187 Catalpa trees the latter were entirely dominated by the Cherry. The average size of the Cherry was:

Average diameter at 1 foot from the ground	5.6 inches
Average diameter at 7 feet from the ground	4.0 inches
Average height.....	32.0 feet
Average clear length of bole..	19.0 feet

THE FORT BAYARD WATERSHED

BY

J. C. BLUMER

FIFTY miles east of the Arizona line, and seventy miles north of the Mexican boundary, on the south slope of the Pinos Altos Mountains of southwestern New Mexico, lies the Ft. Bayard watershed. It embraces the headwaters of Cameron Creek from the United States military hospital at Ft. Bayard northward nearly to the continental divide as it culminates in Black Peak and the Twin Sisters. It thus practically abuts on the backbone of America. The twenty-two square miles of its general southerly exposure

thus lie at an altitude of, roughly, 6,000 to 8,000 feet above sea level. Its southern and lower portion lies within the Ft. Bayard Military Reservation. The remainder, in July, 1905, became part of the Gila Forest Reserve.

The climate is warm and dry, but very much less so than is commonly thought. The average annual precipitation for the last thirty-two years on the neighboring plain has been 15 inches.* As the mountain tops are approached, the rainfall increases. It

*Stockman, Bulletin N, U. S. Weather Bureau.

is conservative to place the average annual rainfall for the watershed in question at 25 inches. There is one pronounced rainy season, and this comes in July and August, usually closing in September. At this season the sweltering people of our cities north and east would do well to come to southwestern New Mexico for their summer resort. The mercury finds the midsummer forenoon too short to rise higher than 85 degrees Fahrenheit,

where the air is quiet and several degrees warmer than in the neighboring valley. Here is encountered at night a stream of cold air on its way from the mountains to the plain, there to replace the heated atmosphere of the day. The light snows and rains that usually fall during the mild winter suffer comparatively little by evaporation and transpiration. When the warmth of spring reappears, this moisture is quickly utilized by the veg-



Photo by W. R. Mattoon.

General View of Bull Pine on North Slope in center and along stream. Juniper and Blue Oak Chaparral on other slopes. Streams run dry except at time of floods; and where fed by a few precious springs.

rarely does it venture above this point. By noon the warm air has ascended to the mountain tops, comes in contact with cooler bodies here and is condensed, clouds begin to lower and descend through the keen atmosphere, and soon to refresh the entire mountain side by shade, or gentle shower, or bursting torrent. The nights are always cool. In autumn it is found advisable to pitch camp upon a knoll,

etation, and it makes as quickened growth. As the drouth and parching heat of spring advances, this growth recedes to a minimum, takes on new impulse and fresh color with the benignant midsummer showers, only to dwindle and fade a second time with the approach of winter.

Thus we find in evergreen trees the phenomenon of two annual rings formed within one year. Since many

pronounced irregularities creep in, however, the determination of age by the counting of rings becomes a task of great difficulty. With the deciduous species the case is different. They usually present plainly but one annual ring per year.

The geologic structure of this drainage basin is varied and interesting. In the southeast portion the gentle swells are paved with great blocks of carboniferous limestone. Resting upon

formation from northeast to southeast, and together with erosion, govern the minor topography. These audesite dikes are often sufficiently mineral-bearing to deflect a transit needle several degrees from its true course. Ascending northward, we find resting upon this formation a body of rhyolite, a whitish acid, volcanic rock, its edge exposed in the form of several water-sculptured terraces that represent as many successive flows of lava.



Photo by W. R. Matoon.

A Closer View of North Slope. Note the deltoid mass of rock fragments and debris in left foreground at base of slope. Immediately above the gully is ten feet deep. This slope not long ago was covered by an open stand of Bull Pine.

this are certain bodies of quartzite of perhaps Triassic age. Mt. Humboldt, marking the easternmost point of the basin, is a cone built of this exceedingly hard material. All the remaining foothill portion of the watershed belongs to an eruptive formation, probably Older Tertiary. It contains certain bodies of volcanic sandstone. Ribs of intrusive rock, usually 8-12 feet wide, at intervals traverse this whole

Surmounting this, and marking the line where the foothills merge into the mountain slopes, come bodies of conglomerate hundreds of feet thick. These are composed of volcanic material, but evidently deposited by water. Spread upon top of the conglomerate, and showing itself continuous throughout the watershed and beyond, is a layer of brown, Miocene or Pliocene basalt, whose edge forms the perpen-

dicular "rim rock," that is such a characteristic feature of the great west. This lava floor has been cut and chiselled by the drippings of the ages until we have to-day a whole system of mesas corresponding to the same, well-nigh perfect level. Above and beyond, reaching to the upper confines of the basin, rise other bodies of conglomerate, capped by still other strata of rhyolite and basalt.

The principal floral type is one of evergreen, orchard-like woodland, and of chapparal. This clothes all the basin except the strictly north slopes. These give rise to a deciduous oak (*Quercus gambelii*) mixed with western yellow pine in an open stand. The strictly evergreen type covers perhaps 90 per cent. or more of the area. The trees and shrubs of general distribution are as follows, named in order of importance from the economic standpoint: Two species of juniper, four of oak, two of pine, mountain mahogany (*Cercocarpus parvifolius*), and *Garrya Wrightii*. The junipers are *Juniperus pachyphloea*, and *Juniperus monosperma*, bearing the local names of juniper and cedar, respectively. The oaks are *Quercus arizonica*, *Quercus hypoleuca*, *Quercus gambelii*, *Quercus emoryi*. The first is locally known as scrub oak; the third as water oak, white oak; while the second and fourth are usually combined under the names of red oak and black jack. The pines: *Pinus edulis*, and *Pinus ponderosa*. The foregoing are within each group placed in order of relative abundance, which, with the possible transposition of the pines, is also the order of present relative economic value.

There occur at least 26 other native species in the basin, nearly all growing along water-courses. The more promising of these for soil-binding on stream banks and other purposes, are: The poplars (*Populus wislizeni*, *Populus angustifolia*), box elder, Mexican walnut (*Juglans rupestris*), cherry (*Prunus salicifolia acutifolia*), willows (*Salix irrorata*, and two others), locust (*Robinia neomexicana*). Aside from tree fruit and small fruit, three

species have been introduced, viz.: *Populus acuminata*, *Sapindus marginatus*, *Sambucus glauca*. The first-named makes a phenomenal growth (5 to 6 feet annually) where water is at hand. The soap-berry, next in order, shows promise in spreading to arid soil.

The chief use of such woody growth as will thrive on this watershed is its power for the conservation of soil and water. The secondary use is almost altogether for firewood and posts. With fuel in the neighboring town of Silver City worth \$6.50 a cord, and juniper posts growing scarce at 40 cents each, this is also important.

The two species that deserve special mention are the alligator juniper (*Juniperus pachyphloea*) and *Quercus arizonica*. Both are of wide and general distribution, and maintain themselves well under adverse conditions, each on certain areas being the only woody plant to survive. The oak grows upon many steep slopes underlain by conglomerate, a soil cover that nature has taken untold centuries of selection to produce, and that man will probably find impossible to improve. The juniper thrives alone on many a grassy mesa, and reproduces vigorously on cut-over areas under surroundings that would kill any ordinary tree, root and branch. The latter is true of the other juniper as well, but this is limited in distribution. Junipers are of slow growth, and necessarily so in a climate like this. Yet the past season (1905) young growth has made an average of about 15 inches, much more than any other species on the same site. On large areas the junipers are capable of forming by far the best soil cover of anything now growing, and it is at least somewhat doubtful if anything better can be made to grow in the future. Moreover, they give the best quality of wood of any species on the watershed, both for fuel and posts. But junipers are hard to produce artificially. The best present way to favor them appears to be to provide the conditions best suited to the production of natural young growth. But it



Courtesy Forest Service.

Stephen's Creek, Ft Bayard Nursery.
Run off during flood after hard showers, August 2, 1905



Courtesy Forest Service.

View taken in same place as preceding view one hour later.
The stream has receded to its normal volume, emanating from springs.

would lead too far to discuss these here.

The stupendous physical forces that have upheaved and convulsed this bit of the earth's surface belong to the unknown past. The more constant and more silent forces that little by little have worn this watershed down to its present topography may never have been so active as at present. The not infrequent cloudbursts corrugate the upper, and especially the north slopes to a remarkable degree, bring down countless tons of rock debris and soil, tear great, gaping channels through the ranches of remarkably rich alluvial adobe soil along the streams, only further down to double devastation by spreading sand, rock, and uprooted trees over other fertile fields and orchards. During the rainy season it is the rule for roads to be impassable. At Ft. Bayard the pumping station and the water supply for the 500 patients has been put in jeopardy. The springs upon which the ranches depend are often obliterated.

Various recently eroded streambeds disclose 10 to 15 feet below the present flood plain the surface of an older one, rich with humus, and often supporting the roots of oak and walnut. While these trees were growing the stream was probably cutting a channel near by, and later overwhelming them by disposition. One stream has recently exposed a log cabin buried in about 12 feet of sediment. Now the cabin was such as white men build, hence was put up less than 400 years ago. Logs not long cut have been buried in various places. These are strong indications that active erosion and deposition takes place in certain cycles, and that these have continued from geologic down through historic time to the present day.

Local testimony bears witness, that a long period previous to 1903 had been very dry. The unusually heavy rainfall of the last two years has caused a tremendous amount of fresh gullying. It is possible that a new cycle of erosion has just begun. The severe grazing of past years that killed

the grama sod over considerable areas, and caused such hardy shrubs as the mountain mahogany to succumb in large numbers, has without doubt contributed much to erosive activity. On several north slopes the last of the pines had been removed. The grasses and herbs of the ground cover had been literally shaved off by cattle and goats. The succeeding rains tore furrows into these slopes fully ten feet deep in places, and no further apart.

But it must not be inferred that had there been no grazing or wood-cutting there would have been no gullies. They would only have been fewer and less deeper. Certain rhyolitic terraces are now being cut clean. The rains are washing the white rock bare of all soil and humus. But it should not be concluded that a forest should stand on those rocks had there been no cutting. If all influence of grazing and wood-cutting, past and present, could be obliterated, the timber would still be scrubby, and it is more than likely that run-off and erosion should still take place to a remarkable degree. The factors that cause this large amount of run-off, erosion, and deposition can be safely put down in the following order: Character of rainfall, soil and rock, topography and vegetation, major factors. Grazing and wood-cutting, minor factors.

Being human factors, grazing and wood-cutting can be controlled. In fact, on the public land in the watershed, they are now being prohibited, and for the present rightly so. But 23 per cent. of the total area is either in private and territorial holdings, or in process of passing into such, the latter in some cases unrightfully. As a result of the prohibition much of this land is now being absolutely denuded of both grass and wood, nor can the bona fide owners be blamed. As an offset it is possible on certain areas of the public domain to reverse the factors of grazing and wood-cutting into that of tree-planting.

A forest nursery was established on the watershed by Mr. Geo. F. Clothier, of the Forest Service, in the sum-

mer of 1905. In December following, 450,000 western yellow pine, and some other seedlings, were growing in it, covering three-fifths of an acre. Planted in July, the pines had made at the end of the growing season two inches of top, and 8 to 12 inches of root, with

over, these same slopes are in most immediate need of attention. This pine should presently do a great deal to relieve the local situation. The further and larger use of the planting will come in the form of an object lesson to the people of that section. But it

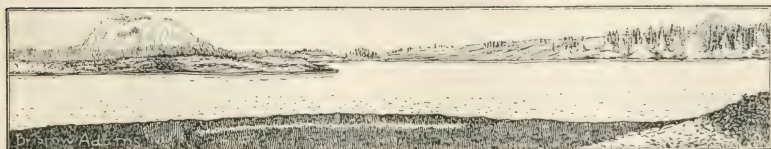


Courtesy Forest Service.

Ft. Bayard Forest Nursery, showing seed beds of Bull Pine, photo taken 30 days from date of seed sowing, August, 1905.

some laterals one inch long. They will probably be ready to transplant in the fall of 1906, or summer of 1907. Their logical place is on the north slopes. Being indigenous here, they should succeed readily when planted. More-

must be conferred that to expect from these measures anything like a complete cessation of erosive activity on the watershed as a whole, even if reasonable time is allowed, would be the merest folly.



RUBBER CULTURE IN THE PHILIPPINE ISLANDS

BY

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ONE of the great problems to be solved in the development of every new country, apart from the principles of government, is, what products are best suited to the climatic and soil conditions at hand.

So important is this matter that every civilized nation maintains numerous agricultural stations and farms, not only at home but throughout its foreign possessions, in order that by careful experiments some light may be cast on this all important subject.

To the business man and the farmer of the Philippine Islands, this question is a very vital one. A considerable amount of capital is usually required to further a large farming project, and it is but natural that the first question that those whose money is involved should ask, is, what returns may we expect, and how long will it be necessary to wait before the first crop can be gathered?

Cocoanuts, hemp, and sugar cane have been planted in these islands for many years, so that the profit that may be secured from these products is generally well known. One reads daily, however, of the large returns received from cultivation in the East, of tropical crops other than those mentioned, and on comparing their gross proceeds with those from cocoanuts or hemp, is surprised to find that the crops planted to the greatest extent in any country, are not always the ones that yield the largest income.

It was undoubtedly on this account that rubber was first introduced into the Philippines, or perhaps it would be more accurate to say, into the Island of Mindanao, as it is in this section of the Archipelago that the greatest amount of planting has been done, through official channels.

Up to the present time Para rubber seed has been secured either from Sandakan, Borneo; or Singapore, through the Bureau of Forestry at Manila, and the Government of the Moro Province, Island of Mindanao. A few private ranch owners have also obtained small shipments of Ceara and Castilloa from Ceylon.

On account of the different methods of treatment, growth, etc., of these various species, they will be considered separately.

PARA RUBBER, (*Hevea brasiliensis*).

During 1905 several small lots of Para seed were received in the Philippines. Early in the year the Moro Government obtained 1,000 seed from Sandakan, Borneo, which were distributed among ranch owners and government officials throughout Mindanao; but of these seed few germinated, due without doubt to their infertility, and the lack of knowledge as to the proper methods of planting.

In October, 1905, the Bureau of Forestry, at Manila, received 5,000 seed from Singapore, 2,500 of which were sent to the Island of Mindanao, where they were planted in seed-beds at the Moro Government Experimental Farm, located on the Zamboanga Peninsula. Although every care possible was given the seed, which were planted within a month from the date of shipment, only about 400 of the total number sprouted. The average rate of growth of these nursery plants was about 18 inches in 50 days, seeds unfilled when planted.

In January of the present year the Moro Government again made a purchase of 6,000 seedlings, which had been raised from seed at the Lamao Forest Reserve, Bataan Province, by the Bureau of Agriculture. One

thousand of these seedlings were distributed to farmers in the vicinity of Zamboanga, and the remainder placed in seed-beds to await a favorable season for planting.

It is the intention of the Provincial Government to distribute a number of these seedlings among principal towns of the island, in order to ascertain which section of the country is best suited to rubber growing. A plantation will also be established on the Government Farm at an elevation of 25 feet above sea level, with sample plots in the surrounding mountains at different altitudes up to 1,200 feet.

CEARA RUBBER, (*Manihot glaziovii*).

As far as is known to the writer, there are only two rubber plantations of any size in the Philippine Islands, and these are located on the Island of Basilan, Moro Province. These plantations are situated at 200 and 250 feet elevation, and contain 2,500 and 1,000 trees respectively. The soil of both of these areas is well drained, rich, heavy loam, with a small amount of volcanic gravel intermixed.

The following figures on the annual rainfall of the island were furnished by the Weather Bureau sub-station at Port Isabela, Basilan:

	Inches.
Year 1903, total rainfall,	65.30
1904, total rainfall,	74.25
1905, total rainfall,	42.43

The Ceara seed, after having been en route for eight months, were filed and planted directly to stake. At the lower elevation 2,500 out of 3,000 seed germinated, while at 500 feet something over 1,000 plants were obtained from 1,500 seed.

The following measurements made by the writer, will be of interest to all rubber growers, and as far as is known compare favorably with the growth of other trees of the same species and age, planted in the East:

Ceara rubber, elevation 500 feet; planted 15x15 feet; age, 7 months 5 days; number of trees measured, 43; average height, 12 feet 5 inches; maximum height, 17 feet; elevation, 200 feet; planted, 15x15 feet; age, 5 months 15 days; number of trees measured, 65; average height, 9 feet 9 inches; maximum height 13 feet.

CASTILLOA RUBBER, (*Castilloa elastica*)

A small Castilloa plantation, containing some 400 seedling trees irregularly spaced, has recently been set out on the Island of Basilan at an elevation of about 50 feet above sea level. The soil on this situation is a rich, heavy loam which has been washed down from the surrounding mountains, and contains but a small amount of gravel.

The measurement of 45 plants in the seed-bed, which are slightly larger than those set out in the plantation, gave the following results:

Castilloa rubber, age, 4 months 25 days; number of seedlings measured, 45; average height, 17 inches; maximum height 29 inches.

After watching the growth of Para and Castilloa seedlings in nursery beds, and Ceara trees in plantation, it is the foresters opinion that all of these species are well suited to the climatic and soil conditions as found in the Island of Mindanao.

Rambong (*Ficus elastica*), the other great rubber producing species under cultivation, has been planted singly in private grounds in many towns in the islands. All seem to thrive well.

Which of these four species will give the greatest returns per acre in the islands is a question which time alone can solve. Almost every large ranch owner in the eastern part of the Island of Mindanao will plant more or less rubber this year. Plans are being made to try all the principal kinds of rubber trees, and it is hoped that the species best adapted to the Philippines may be determined in the near future.

With the ever increasing demand for rubber, the limited areas suitable for its production, and the rapid exhaustion of the jungle product, it will doubtless be many years before the supply ever in a small measure be able to meet the demand.

In this new country we have been slow in starting to plant rubber, but the first step in the right direction has been taken, and the day may not be far distant when the Philippine Islands will be reckoned as an important factor among the rubber producing countries of the world.



History of Past Month in Government Forest Work

Veneer Stock in 1905

Probably no branch of forest utilization, with the possible exception of the manufacture of pulpwood, shows such rapid development in this country as the veneer industry. Until very recently the opinion has prevailed that the kinds of timber which could be made into veneer were very limited in number, but the reports furnished by the veneer producers to the Forest Service include 24 species. Many of these, to be sure, are now cut in unimportant quantities, but the tendency to experiment with new woods is clearly shown.

The following statement as to the kinds and quantities of wood used for the manufacture of veneer stock in 1905 is compiled from the reports furnished to the Forest Service by 93 firms. It should be noted that the total amount of wood used, 138,646,000 feet, is in log measure. As the amount of lumber actually cut from the log averages about 20 per cent greater than the log measure, it is safe to say that the timber used for veneer stock would have made some 166,000,000 feet of ordinary lumber.

Wood used for veneer stock.

Kind.	Feet, log measure	Per cent of total
Red gum	29,739,000	21.5
Yellow poplar	20,513,000	15.0
Maple	18,943,000	13.4
Cottonwood	13,942,000	10.1
White oak	10,639,000	8.0
Birch	9,983,000	7.0
Basswood	8,994,000	6.5
Pine	5,515,000	3.8
Fir	4,292,000	2.7
Red oak	3,892,000	2.8
Ash	1,893,000	1.3
Beech	1,200,000	.8
Other species	9,584,000	6.9
Total	138,646,000	100.0

All species for which a total cut of less than 1,000,000 feet was reported are tabulated, together with mixed timber, under the heading "Other species," which includes sycamore, tupelo, chestnut, hickory, pecan, butternut, cherry, spruce, cypress, hackberry, locust, and willow.

Reserve Timber Sales

The demand for lodgepole pine ties by the western railroads, which prefer them to any other because of the ease with which they take preservatives, has greatly increased the market value of the Rocky Mountain forests in northern Colorado, Wyoming, eastern Idaho, and southern Montana, where lodgepole pine is the predominant tree. These forests are largely within existing or proposed national forest reserves, and are consequently under government control, so that the Forest Service has felt the need of preparing plans to permit the sale of such mature timber in them as may be safely spared. During the past year a working plan was completed for about 46,000 acres in the Wyoming Division of the Medicine Bow Reserve.

It was found in the first place that the protective value of the forest as a cover for the watersheds is so great that any utilization of the timber crop must be subordinated to it. Throughout the region the control of stream flow by the forest cover is the prime consideration.

The mining industry, which is of high importance, will not be hampered by the disposal of reserve timber, since all the mining claims located in or near the tract include timber sufficient for the needs of the owners. The pres-

ent moderate grazing of cattle is carried on without risk to reproduction of the forest.

The Medicine Bow Forest Reserve contains the largest continuous body of lodgepole pine to be found in the Rocky Mountains. The timber on the tract for which the plan was made is accessible; tie cutting has been carried on in the reserve for some years; and it was definitely known that all the timber which could safely be removed would find a ready sale. Measurements in the woods and careful studies of the rate of past growth and of the forest's power of self-renewal furnished data from which the government foresters calculated what the forest can be expected to yield and what per cent can be cut safely now. It was found that 165,000,000 feet B. M. of lodgepole pine could be taken out and yet leave a large percentage for future crops. Special studies were made of the injury to which the forest is liable from insect attack and fungus, from windfall and fire. Local market conditions and the methods and cost of lumbering were investigated to see whether improvements and economies might not be instituted, as well as to fix upon a fair stumpage price.

Products of Hardwood Distillation

Reports made to the Forest Service by 58 hardwood distillers have been compiled, so as to give the following preliminary statement of the number of cords of hardwood required by this industry and the volume of its products. The woods almost universally used are beech, birch, and maple, only a little over 1 per cent being oak and chestnut.

State.	Wood used.	Products.			
		Alcohol	Acetate.	Char- coal.	
		Cords.	Gallons.	Pounds.	Bushels.
Pennsylvania.....	208,861	2,242,899	39,573,508	7,890,346	
New York.....	113,036	1,091,571	24,189,234	4,075,595	
Michigan.....	239,992	1,946,121	14,778,695	8,193,387	
Other States.....	8,522	93,361	510,777	2,643,955	
Total.....	570,411	4,674,522	79,051,214	22,803,283	

Consumption of Tanbark

The preliminary statement of the consumption of tanbark in 1905 is compiled from the reports of 440 firms to the Forest Service. These firms purchased hemlock and oak bark during the year as follows:

Bark purchased.

Kind.	Number of cords.	Per cent.
Hemlock	766,268	72.3
Oak	293,758	27.7
Total	1,060,026	100.0

The bark purchased was obtained from the various States as follows:

Hemlock bark.

State from which obtained.	Number of cords.	Per cent.
Pennsylvania	379,733	49.5
Michigan.....	219,852	28.5
Wisconsin.....	68,247	9.0
West Virginia.....	37,812	5.0
Maine.....	29,700	3.9
New York.....	13,638	1.7
Vermont.....	7,451	1.0
Other States.....	10,595	1.8
Total	766,268	100.0

Oak bark.

State from which obtained.	Number of cords.	Per cent.
Virginia.....	68,764	23.4
California.....	48,144	16.4
Pennsylvania.....	46,903	16.0
West Virginia.....	37,890	12.9
Tennessee.....	28,599	9.7
North Carolina.....	27,876	9.5
Kentucky.....	17,648	6.0
Maryland.....	7,423	2.5
Georgia.....	4,457	1.5
Ohio.....	4,123	1.4
Other States.....	1,931	.7
Total	293,758	100.0

Forest Plant- ing Stations

Seven different states now have eight forest experiment stations, established during the past year, for co-operation between the Forest Service and State forest commissions and agricultural colleges. These stations are designed to meet the growing demand for detailed information on the propagation of forest trees in various regions.

As a result of regional studies and special investigations, the Forest Ser-

vice is already in possession of very complete data on tree growing for protection and timber supply, and this information is gladly supplied upon request. There are many questions, however, regarding new species, nursery methods, mixtures, spacing, and cultivation which can not be satisfactorily settled by studies of existing plantations. These matters will be investigated by a long series of systematic experiments, now under way at the new stations.

Arrangements have been made for experimental forest planting in co-operation with the New York State Forest, Fish and Game Commission, at Saranac Inn in the Adirondacks; with the Michigan Forestry Commission, at Roscommon; with the University of Michigan, at Ann Arbor; with Berea College, Kentucky; with the State Agricultural Colleges at Ames, Iowa, Fargo, N. Dak., and Agricultural College, Miss., and with the sub-station of the University of Nebraska, at North Platte. The work contemplated needs constant expert supervision, and great care has been exercised to limit the stations to regions where additional data on forest planting are needed. Most of the stations are at institutions where regular courses in forestry are given, and the work is directed by the forester in charge.

The co-operating institutions in most cases contribute the necessary land, and share all expenses for material and labor equally with the Forest Service. The Service passes upon all plans and directs the general operations. The results are the joint property of the co-operating parties.

Production of Tight Coopera The following preliminary statistics of the production of tight-cooperation stock in 1905 are compiled from the reports of 124 firms to the Forest Service. The number of staves reported is 158,988,000, and the number of sets of heading, 8,030,000.

The importance of white oak to the tight-cooperation industry is shown by the fact that over 92 per cent of the

staves and 88 per cent of the heading were manufactured from it. It is also important that over one-third of the staves and heading reported were manufactured for alcoholic packages, which require the highest grade of white oak, and that 31 per cent of these staves were bucked and split or hewed.

Sawed staves—Alcoholic stock.

Kind.	Timber.	Number.
Bourbon.....	White oak.....	18,423,000
Spirit and wine.....	do.....	15,117,000
Half barrel.....	do.....	3,548,000
Total.....		37,088,000

Bucked and split or hewed staves—Alcoholic stock.

Kind.	Timber.	Number.
French claret.....	White oak.....	7,687,000
Bourbon.....	do.....	4,470,000
Spirit and wine.....	do.....	1,522,000
Seconds.....	do.....	1,438,000
West Indian.....	do.....	989,000
Half barrel.....	do.....	291,000
Pipe.....	do.....	95,000
Miscellaneous.....	do.....	171,000
Total.....		16,693,000

Sawed staves—Oil, packing-house, and sirup stock.

Kind.	Timber.	Number.
Oil and tierce.....	White oak.....	76,930,000
Do.....	Red oak.....	6,545,000
Pork.....	White oak.....	6,060,000
Sirup.....	Gum.....	2,431,000
Oleomargarine.....	White oak.....	1,126,000
Sirup.....	Cypress.....	80,000
Miscellaneous.....	Ash.....	314,000
Cut-offs.....	White and red oak.....	11,721,000
Total.....		105,207,000

Heading.

Kind.	Timber.	Number of sets.
Bourbon.....	White oak.....	1,763,000
Spirit and wine.....	do.....	1,197,000
Oil and tierce.....	do.....	3,734,000
Half barrel and keg.....	do.....	1,099,000
Pork.....	do.....	208,000
Do.....	Ash.....	29,000
Total.....		8,030,000

Figures on Pulpwood

The work of the Forest Service in gathering statistics of forest products for the past year has furnished the basis for a provisional statement of the

wood consumed in the manufacture of paper pulp. As the accompanying table shows, the returns from 159 firms, controlling 232 pulp mills, give over 3,000,000 cords as the total amount of wood used.

Wood.	Cords.
Spruce (domestic)	1,564,000
Spruce (imported)	611,000
Poplar (domestic)	274,000
Poplar (imported)	22,000
Hemlock	370,000
Pine	57,000
Balsam	22,000
Miscellaneous	93,000
Total	3,016,000

The wood used was divided among the various processes as follows: Sulphite, 1,538,000 cords; soda, 410,000 cords; ground wood, 1,068,000 cords. The total pulp production by all processes by the firms reporting was 1,993,000 tons. According to the census of 1900, the consumption of pulpwood was then 1,986,310 cords, so that there has been an increase of over 50 per cent in the last six years. This demonstrates, in a striking manner, the drain upon the forests caused by the pulp industry.

Wood Used in Box Making

The returns received by the Forest Service showing the woods used in box making in New England during the past year make possible the following preliminary statement.

The first table shows that 292 box factories used 600,493,000 feet of lumber, valued at \$8,831,000 delivered at the factories:

Kind of wood.	Feet.	Per cent.
White pine	491,302,000	81.1
Spruce	59,354,000	9.9
Hemlock	25,945,000	4.4
Beech	8,442,000	2.0
Birch		
Maple		
Fir		
Other woods	7,964,000	1.4
	7,486,000	1.2

Under "other woods" are included poplar, chestnut, basswood, pitch pine, and a small quantity of yellow pine.

The second table shows the percentage manufactured by each state:

State.	Per cent.
Massachusetts	48
New Hampshire	21
Maine	20
Vermont	7
Connecticut	2
Rhode Island	2

The above figures include the lumber used in making all kinds of boxes, such as lock-corner, dovetail, and nailed boxes, and box shooks.

The consumption of 491,302,000 feet of white pine, or nearly five times as much as of all other woods combined, shows its great importance to the box makers of this region.

New Forest Reserves

The Ashland Forest Reserve, in Oregon, has just been enlarged, and the Vernon Forest Reserve, in Utah, created by proclamation of the President.

The expansion of the boundary of the Ashland Reserve has been made for the purpose of including more fully the watershed of Ashland Creek, which is the source of water supply for the city of Ashland and for a large territory of agricultural land in that vicinity. The reserve, which was originally established upon request of the common council and board of trade of the city of Ashland, presented in a memorial and petition to the President, includes a rough, mountainous tract, covered largely with timber of an inferior quality and a dense growth of underbrush needed as a protection cover to Ashland Creek.

The narrow strip of country which has been added to it is of a similar character, consisting of a tract lying along the summit of a spur from the Siskiyou Mountains, which has an average elevation of about 7,200 feet, and culminates in one of the most prominent landmarks in southern Oregon, known as Siskiyou Peak, or Ashland Butte, which rises to a height of 8,025 feet.

The tract is unfit for cultivation and has no settlements on it. As, how-

ever, it forms the watershed of various tributaries to Ashland Creek, it is important to insure proper protection to its forest cover and to prevent the streams from being contaminated in any way. This will now be carefully attended to by the forest officer in charge of the reserve.

The Vernon Reserve, containing 68,000 acres, lies in the extreme southeastern corner of Toole county, Utah, embracing the southern end of the Onaqui Range, which rises in places to a height of about 9,500 feet, and forms the two divides between Rush, East Rush, and Skull valleys.

The streams flowing from this tract are essential to the settlers at the heads of these valleys, who depend upon them at present for the irrigation of about 3,000 acres of land. Formerly, the water supply was much more abundant. In the days of the early settlement of this locality, the streams are said to have been three times their present size, and to have been used all the way down the valleys. In Rush Valley water made its way in the spring as far north as Stockton Lake, and the south end of the valley supported a population of 300 people, while now there are not more than 100 people there. Stockton Lake, at that time, covered an expanse of two by five miles, fed mostly by streams flowing from the hills which have been included in this reserve; and there were also 200 or 300 acres of wild hay meadows. Now, both the lake and meadows have dried up; and as the result, the ranches south of the lake have gradually been abandoned, until the population is now less than one-third its former size.

An official examination of this region to determine the cause of this lessening of the waterflow, has resulted in showing that the change in conditions during the past twenty-five years has been caused by overgrazing on this watershed, and that protection to the headwaters of the streams is essential if settlement is to continue in these valleys.

Beasts of Prey Wolves and mountain lions are giving the stockmen a good deal of trouble on the ranges in several of the

National forest reserves. Vigorous complaints have been made to the Forest Service of the loss of cattle and sheep, particularly cattle, from this cause. Protection is sought by the stockmen, and the Forest Service, which collects a fee for the grazing permits, has promptly assumed the task of finding and putting into effect practical measures to aid the cattle owners in exterminating the destructive animals.

The chief difficulty has been on the Wind River Division of the Yellowstone reserve, in Wyoming. Some of the livestock companies in the region assert that the wolves are increasing so rapidly that the future welfare of the cattle industry is in serious danger. Among the proposals which these conditions have called forth are that a bounty be offered for the animals' destruction. The stockmen along the northern boundary of the Gila reserve, in New Mexico, and in the Wichita, in Oklahoma, have suffered almost as severely.

Last spring the government appointed John Goff, the skillful hunter who acted as guide to the President during his hunting trip a year ago, as Forest Ranger, and set him to hunting "lions" in the Shoshone Division of the Yellowstone reserve, in Montana. Now that the appeal from the stockmen on other reserves is so vigorous, especially for the extermination of the wolves, the Service has just sent an expert into the field to study the wolf problem. The man selected for this work is a recognized authority on the game and other wild animals of the country, Mr. Vernon Bailey, Chief Field Naturalist of the Biological Survey, from which he has been temporarily transferred in order to secure his services for this important project.

The animals which are causing so much trouble to stockmen are common in their native habitat, but are little known to Easterners who have not hunted them. The wolf is known in the West as the "timber" wolf. Though not large, it is powerful and quick. Not only does it kill calves and yearlings with ease, but it attacks and overcomes full-grown cattle. When after this larger prey it does not go for the

throat, as so many beasts do, but fastens its teeth in the muscles of the leg, hamstringing its victim, which falls defenseless. But little of the carcass is usually devoured by the wolves. The "lion" is, of course, the cougar, and no true lion at all. Nevertheless, it is a large and powerful beast, capable of playing havoc among the cattle.

The wolves and lions are not classed in the West as game animals, but are regarded as pests and are commonly termed "varmints." Wherever they are plentiful a bounty is offered to encourage their extermination. Despite this, they are still sufficiently numerous to work much harm, and it is said that in some localities they are on the increase.

It is particularly notable that there has been so much complaint from the Wichita reserve, which the President

has set aside as a game refuge. The wolves and cougars are the enemies of other wild animals, and the sportsman, who desires to encourage American sport and to preserve American game, can be counted on to aid in the work of hunting them down.

In any case, however, the lion and the wolf must be driven from the ranges. Interests larger and more substantial than those of the huntsman and trapper demand it. The great livestock industry, which the Forest Service has pledged itself to encourage in all legitimate directions, has had to pay heavy costs in the loss of cattle, young and full grown. That those holding permits may be assured the full enjoyment of their privilege unmolested, every effort will be made by the government to co-operate with the stockmen in protecting herds grazing on the reserves from attack.

WASHINGTON STATE NOTES

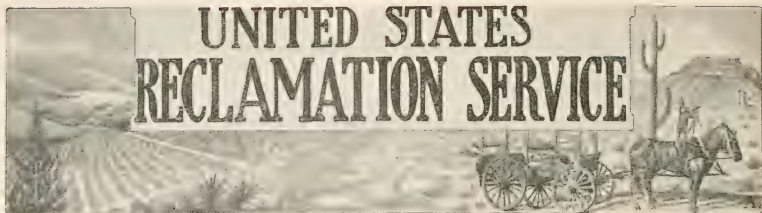
State Fire Warden Welty, of Washington, will ask the prominent timber owners and mill men of the State to contribute to the fund to maintain the forestry service during the year. The last State legislature appropriated money for this and provided for additional appropriations from the counties, but much of this money is not available and the fund has been exhausted. Therefore, in order to continue the service the mill men will be asked to make necessary contributions.

The Waha Land and Water Company has opened bids for the construction of 22 miles of ditch, three tunnels and two immense dams, the contract prices for which will aggregate about \$500,000. The work is a part of the big irrigation system which the water company will establish south of Lewiston, Idaho, to reclaim 20,000 acres of land. The work completed will cost three times this initial expenditure. The present work will irrigate about 8,000 acres and will be completed this year.

It is believed that the approval by the Secretary of the Interior of the Benton and Sunnyside irrigation project means a great and rapid development for the central portion of Washington. Reclamation engineers say when the work of irrigation is started, it means the reclamation of 400,000 acres of some of the best soil in the world when supplied with water, and that \$10,000,000 will be expended in the coming ten years, beginning at once. In Benton county alone 200,000 acres will be irrigated.

L. MacLean and E. G. Taylor, both of Spokane, have purchased lumber for a flume which will tap Newman lake and irrigate 1,200 acres of land north of Spokane bridge. The flume will be about four miles long. John T. Whistler, of the Government Reclamation Service, says if everything progresses satisfactorily bids for the construction of the government dam of the East Umatilla, Oregon, project will be advertised for about May 1. Practically all those owning lands under the project have signed up in the Water Users' Association.

UNITED STATES RECLAMATION SERVICE



Rights of Settlers

In further consideration of rights of settlers to payment by the United States for improvements made by them on unsurveyed public lands, the Assistant Attorney General in an opinion approved by the Secretary of the Interior, April 12, 1906, states as follows:

" . . . that settlers upon public lands appropriated by the Government for the use in construction and operation of irrigation works, who have made a bona fide settlement and have continued to comply with the law as to residence upon and cultivation and improvement of the land settled upon, are entitled to be compensated for their improvements, although they have not placed their claim of record because of the unsurveyed condition of the land. But the bona fide character of the settlement, and the acts of the settler should be clearly established before allowing compensation, when the settler has not indicated his purpose and intent by placing his claim of record, whether from the unsurveyed condition of the land or from other cause."

Interest in American Irrigation

The work of the National Government in reclaiming its western arid areas is attracting the attention of other nations. There is a growing demand from Canada and South American governments for information regarding the development of irrigation projects and the methods followed by the United States in obtaining and compiling stream measurements and in making topographic surveys.

One feature of the preliminary work of the U. S. Reclamation Service—that of making a diagnosis of the soil for the purpose of obtaining the quantity of salts it contains has called forth inquiries from distant India. The irrigators in Bunna Valley in the Punjab province have been having serious trouble owing to the swamping and deterioration of the lower valley lands. The streams draining the Salt Range on one side of the valley carry quantities of salt in solution, and considerable areas have been ruined by this means. Similar conditions exist in some parts of our western country, and the engineers have devised means for successfully overcoming the difficulties. All of the Government projects in such localities are provided with sufficient drainage systems which serve to carry off the harmful minerals in the water. When the topography of the country is such that the salts cannot be carried by means of ditches into the river, they are led into depressions and evaporated.

The accumulated salts have a commercial value which may make their removal profitable. A plan similar to the above has been suggested by the Reclamation Service to the India engineers as one which might tend to ameliorate conditions at Bunna.

Floods in Arizona

The Reclamation Service is having its share of trouble with floods in the Salt River Valley, Arizona. Two unusual floods occurred in March, causing considerable damage to private property in the Valley and some delay to the Government work.

During the last flood Salt River took a sharp bend to the south near the intake of the power canal and made it necessary to construct works to prevent serious damage to the canal. The emergency was so great that a large force of men was immediately put to work at this point. The Government has contracted to furnish power to the contractor who is to build the great reservoir dam, one of the highest structures of the kind in the world, and any injury to the power canal would cause severe loss to the contractor.

In Arizona the Reclamation engineers are being dubbed "rain-makers," as ever since their appearance in Salt River Valley the floods have been of frequent occurrence and of unprecedented volume.

Nevada Work Progressing The construction of the Truckee-Carson project, Nevada, is progressing rapidly. At the present time 85 per cent of the works required to supply the first 160,000 acres is completed. During the present stage of high water in Carson River the Truckee River is not supplying the system, as the flow of the former is ample at this time.

Three vitrified pipe openings have been set in the main canal and water will be delivered to settlers under this part of the system during the month of May. The old and new settlers under the main distributing system are now receiving their supply from it, and with the exception of two districts the lateral systems are now delivering water. It is expected that the entire lateral system will be in working order at the end of the month. On force account work is now being carried on by the Government in six camps 400 men and 450 head of stock are employed.

Uncle Sam, Cement Maker Uncle Sam wants Portland cement and wants it badly. With 24 big irrigation projects under construction requiring hundreds of thousands of barrels of cement the engineers are

finding it next to impossible to obtain anything like the quantity needed. The unprecedented demand for this commodity all over the West has already over-taxed the capacity of the mills, and almost without exception the Government's requests for bids are turned down. Apparently no manufacturers west of the Mississippi are able to supply new orders. In reply to inquiries from the Government they state that, owing to the unusual demand new orders cannot be accepted for several months to come. Recently proposals were requested from eight manufacturers and dealers in cement for 2,000 barrels required on an Idaho project. Only one proposal was received and that was at a rate 50 per cent higher than the firm would have sold a few months ago. Still later invitations for bids for several thousand barrels were sent to 23 dealers. Again but one firm submitted a bid, and this was nearly 60 per cent higher than the normal profitable rate of sale by this firm. Other attempts to purchase cement have been similarly unsuccessful.

The Reclamation Service is gravely concerned. It has let contracts for structures involving millions of dollars, and a failure to secure cement as needed, entering as it does so largely in the work, will be disastrous. Owing to the inaccessibility of many of the Government works, the transportation of cement is difficult and costly. This was particularly the case in Salt River Valley in Arizona, where the great distance from existing mills and the expensive wagon haul, made the cost prohibitive. After making thorough investigation of the cost of bringing in cement for the Roosevelt Dam and other structures, the Government erected its own mill and for several months past has been turning out daily hundreds of barrels of first-class cement at a price far below the cost of cement shipped in. It is known that materials required for manufacturing cement of good quality exist near several of the projects, and private parties should embrace the opportunity to go into the business. From the present

outlook, however, the Government seems to have a choice of shipping from the far eastern seaboard or from Europe, or of manufacturing its own cement.

Water Supply for Yuma

The town of Yuma, Arizona, lies entirely within the lines of the Yuma reclamation project, and at present has an execrable water system. The water

from its irrigation projects to cities within or adjacent to the irrigated areas, and the citizens of Yuma, by a petition which has been signed by the largest property holders, are urging the town council to make an application to the Secretary of the Interior for a waer right. This will probably be the first application under the new law.



Carrying Supplies into Roosevelt, Arizona, before the wagon road was completed.

is now pumped directly from the river into settling tanks, and from these is distributed through the mains. Only a small part of the town is supplied with filtered water and the price is almost prohibitory. The climatic conditions being arid and nearly semitropical the town requires a larger proportional share of water than almost any other city in the United States.

A recent act of Congress provides that the Government may supply water

Co-operative Crop Experiments

Present indications are that Western Nebraska is to be one of the first sections to be benefited by the recent arrangement for coöperative crop experiments between the Department of Agriculture and the Reclamation Service. These experiments are to be carried on within the limits of or adjacent to areas covered by irrigation works constructed by the Government, and the stockholders of the North Platte

Valley Water Users' Association in a recent memorial to the Secretary of the Interior requested that land be segregated for reservoir, park, experimental and demonstration purposes. Favorable action has been taken by Secretary Hitchcock on this request.

This work will be of inestimable value in instructing the settlers in the fundamentals of irrigation and demonstrating what may be done in that section by the scientific application of water and by dry farming. An especially interesting feature will be the

name with which it is proposed to grace the reservoir. Out of consideration and esteem for the daughter of President Roosevelt the settlers have expressed the desire to christen the artificial body of water "Lake Alice." The lands adjoin the reservoir and are to be parked and beautified with trees, flowers, and shrubbery. Altogether the request is a pretty compliment to the daughter of the man to whose intelligent and persistent efforts the present work of reclaiming the arid West is largely due.

THE PECOS RIVER FOREST RESERVE

BY

L. P. KNEIPP

THE Pecos River Reserve was the second of the Federal Forest Reserves to have its economic advantages recognized, it having been created in its original form by Presidential proclamation on January 11, 1892, and was increased to its present area by a second proclamation, dated May 27, 1898. It is also entitled to the credit of being the first of all the Federal Reserves to be trod by the foot of the white man, for almost within its limits are the villages first visited by the hard fighting *caballeros* that followed Coronado in his search for the fabled seven cities in 1541. Notwithstanding this fact much of the reserve is still a country whose splendid stands of timber have not yet felt the ever-advancing and all-destroying axe of the railroad tie contractor, whose onward march, however, has halted only at the boundaries of the reserve.

This reserve is situated in about the center of the north half of the Territory of New Mexico, and covers parts of Santa Fe, San Miguel, Mora, and Rio Arriba counties. Topographically it comprises two ranges of mountains known locally as the Santa Fe range, and the Las Vegas range, both of

which are spurs of the Sangre de Cristo range, which forms part of the Rocky Mountain system, the altitude ranges from 7,500 feet to 13,350 feet, but the average elevation is from 8,000 to 10,000 feet.

The area of the reserve is 430,880 acres, or a trifle over 673 square miles; approximately speaking this acreage is divided about as follows: Merchantable timber, 200,000 acres; old burns now undergoing the slow process of natural reforestation, 100,000 acres; the balance, 130,880 acres, consists of open park and mountain meadow grazing land, and the barren peaks of the higher mountains.

No figures are obtainable regarding the stand of timber on this reserve, and it would appear that no systematic attempt has been made to estimate it yet; in round figures the reserve contains about a half a billion feet board measure of merchantable timber, averaging thirty per cent, western yellow pine, the balance chiefly Englemann spruce.

The most important factor in forest preservation as applied to New Mexico is the protection of the main watersheds to such an extent as to insure

the most equal and continuous flow of water possible. The reason is most apparent; almost all of the agricultural products of New Mexico are produced by irrigation and as the larger percentage of the population are engaged in agricultural or pastoral pursuits, it is evident that nothing could cause an era of hard times and suffering as general as that which would follow a series of floods followed by a shortage of water.

The Pecos River Forest Reserve is situated upon one of the most important water sheds of the territory. Within its limits are the head waters of the Pecos River which traverses New Mexico and Texas on the way to its junction with the Rio Grande, and whose course may be traced by the number of fine ranches watered by it; and also the head waters of the Mora River whose importance in relation to the agricultural wealth of the territory is almost as great. In addition to these two streams the reserve contains the sources of several very important tributaries to the Rio Grande which before being lost in the sandy bed of the Big River of the North, give life and fertility to thousands of acres of land and thereby sustain a large agricultural population that would otherwise be without resources of any sort.

It is a noteworthy fact that none of the streams above mentioned attain their maximum height until the last of May or during the month of June, at a time when the lower country is becoming parched and dry and when water for irrigation purposes is badly needed; even then the run off is gradual, usually extending throughout a period of from two weeks to a month. Snow balling in June is a common amusement of the summer visitors to the timbered portions of the higher ranges and in some years the pleasure may be enjoyed during the month of July.

In addition to the irrigation features, it might be mentioned that in and adjacent to the reserve are a number of sites for power plants, valueless to-

day, but all of which will some day be utilized. It is hardly necessary to state that the value of such plants will depend upon a steady and continuous flow of water guaranteed by well-forested water sheds.

Next in importance to the protection of the water sheds, at the present time, is the grazing of stock. From 7,000 to 8,000 head of cattle and horses are allowed upon the reserve each year. Sheep and goats are excluded entirely and have been for a number of years. About thirty per cent of the stock grazed under permits is owned by resident ranchers, the balance is held by neighboring stock owners whose ranches are located from one to five miles outside of the reserve and whose interests in the reserve are almost as great as the interests of the residents themselves. The number of permit holders is from 175 to 200, making the average number of cattle and horses owned by each about forty, the holdings ranging from 3 to 430 head, there being one bunch of the latter figure, the next largest being a trifle over 200 head, and the balance very evenly divided. It is apparent that under Government administration there is no monopoly of choice ranges. The grazing areas are allotted with a view of giving each stock owner the most convenient and advantageous range possible, and the small owner no longer has to suffer the injustice of having his range eaten out by the transient cattleman whose interest in the ranges was but temporary, ending when his cattle were taken out of the mountains.

The importance of the reserve as a permanent source of timber supply is hardly recognized yet; still it is daily becoming more apparent that the timber resources of New Mexico are being rapidly exhausted. And it is with astonishing frequency that one hears from representative men the remark "timber is timber nowadays" clearly indicating that the more thoughtful foresee the day when New Mexico, its magnificent forests destroyed, or retarded by indiscriminate cutting, will

need for its development the splendid natural heritage that was sacrificed rather than utilized.

The productive power of the Pecos River Forest Reserve is great; soil, moisture, and heat conditions are of the best, and three quarters of the reserve is land that will produce merchantable timber. At the present time the high cost of production and low timber values make it impossible to completely utilize the timber resources of the reserve, but when the inevitable era of cheap and economical production and high timber values arrives, the reserve should be capable of an annual production of five million feet.

A factor that while of somewhat lesser importance is still worthy of note, is the value of the reserve as a game retreat. Deer are rapidly increasing in number and are so well protected that they display little or no fright at the sight of men. Bear and mountain lions are plentiful as are smaller animals, the rapidly decreasing wild turkey is still to be found though not in large numbers, while there is an abundance of grouse and other game birds. All of the rangers are commissioned game wardens, with the right to make arrests; they are interested in this branch of the work and have had a prominent part in the enforcement of the game laws.

A fact that may be worthy of mention is that private capital is beginning to follow the example of the Government in husbanding timber resources. On the Maxwell and Mora land grants systems of timber inspection have been in effect for some time, inspectors are employed and the rules in force relative to the cutting of timber are in some respects more stringent than those governing the Federal Forest Reserves. A penalty is placed upon the cutting of undersized timber, and upon

the wastage of merchantable timber; while the announcement is made that any person starting a forest fire will be prosecuted under the territorial laws. Another case is that of the Atchison, Topeka and Santa Fe Railroad which owns about a township of timbered land adjacent to the reserve. It has requested a prominent local timber operator to take charge of its holdings and to conduct the cuttings in accordance with the rules and regulations governing timber cuttings in forest reserves; the object being to husband the timber resources of the land and to secure as far as possible a permanent supply of timber.

These movements are significant, and indicate that the proclamations that set aside the Pecos River Forest Reserve with the object of protecting the numerous and varied interests connected with it were not made a day too soon.

The serious nature of the problem which confronts the engineers will be appreciated when it is known that since the initiation of the work the Gila has twice so changed its channel and the topography of the country by cutting out in places and building up in others that re-surveys and plans of structure have been made and re-made by reason thereof. The levees are now ready for construction, but until they are completed the uncertainty of the behavior of the Gila renders it unwise to let the work by contract under definite plans as contractors must necessarily be governed by the conditions, and their bids will be made high accordingly. There is urgent need of haste.

The Secretary of the Interior, recognizing these facts and upon recommendation of the board of consulting engineers who investigated the situation, has ordered that the work be undertaken immediately by the Reclamation Service by force account.



RECLAMATION WORK IN NORTH DAKOTA

BY

H. N. SAVAGE

Supervising Engineer, U. S. Reclamation Service.

THREE pumping projects are under consideration in North Dakota, and drawings and specifications have been developed for each of the three.

The Buford-Trenton project contemplates the irrigation of 8,000 acres, which may be increased to 20,000 or more in case the land owners desire to avail themselves of the opportunity. A water users' association has been organized, stock subscriptions made, and a contract is being executed with the Secretary of the Interior which will insure the early construction of the work.

The Williston project looks to the irrigation of 12,000 acres, which may be increased to from 35,000 to 40,000 whenever the land owners make satisfactory arrangements. A water users' association has been organized and a contract will soon be executed and transmitted to the Secretary of the Interior for his approval.

The Nesson project involves the irrigation of 12,000 acres. A water users' association has been organized and stock subscriptions are now being received. It is expected that the land owners will enter into a contract and submit same to the Secretary of the Interior at an early date.

These three projects are located on the left or north side of the Missouri River, in the extreme western part of North Dakota. The fall of the river is so slight that it is not possible to take out a canal and distribute the water by gravity, therefore pumping is necessarily resorted to. The abundance of lignite fuel in the immediate

vicinity makes possible the development of power at an economical cost. Very careful topographic surveys were made during the season of 1905 of all the lands in the vicinity of each of these projects. The engineers have made a very careful study of the topography in order to develop the most economical and efficient location for distribution canals.

The plans developed contemplate power stations located adjacent to the lignite mines and the transmission electrically of the power generated. Owing to the changeable current of the Missouri River careful consideration has been given to the establishment of at least one of these pumping stations on a barge. The electrical actuation of the pumps by motor makes this plan not only feasible but very attractive. The pumps would be connected with the canal on shore by flexible joint pipes, and the barge would accommodate itself to variations of water level in the river, and also if the river should move in nearer shore or leave the present shore altogether, the barge could readily follow the channel, and by an extension or decrease in the length of the barge pipe continue to deliver water, thus protecting the irrigated crops against any change in the river.

The land owners are evincing a great deal of enthusiasm regarding the development of these projects, and it is hoped that actual construction can be begun this season. A lively movement in real estate has already taken place in anticipation of the early construction of the works.

PUMPING WATER

Second Paper

THROUGHOUT a great part of the arid and semi-arid region there are localities where water can be obtained at a short distance from the surface. The amount, although not large in the aggregate when compared with the quantity in some notable streams or lake, is yet inexhaustible by the ordinary methods of pumping. If, therefore, this water which exists from 10 to 50 feet beneath the surface can be cheaply raised, it will be practicable to utilize it for agriculture tracts which otherwise have little or no value.

The irrigation of 20 acres in the midst of a section or township of land is, figuratively speaking, a mere drop in the bucket; but the reclamation of this small area generally means the utilization of adjoining lands. If, for example, 20 acres of some forage crop like alfalfa is made possible, this will result in obtaining a considerable amount of winter feed used in the sustenance of a herd which can be pastured upon the surrounding dry land. The successful cultivation of this 20 acres may thus directly or indirectly support a family, and, with increased experience and adaptation to the surrounding conditions, the family may in turn give place to a rural community. Given the existence of sufficient water underground to irrigate the 20 acres, the first question is that of ways and means of bringing the water to the surface.

The force which is ever present, making itself persistently felt throughout the Great Plains region, is the wind which blows almost continuously. It carries the dust before it, cuts out the traveled roads, carries away the fine earth of the tilled fields, and builds up a fine loess, almost everywhere to be found. The wind, which has so long been considered as an annoyance and mischief-maker, has sufficient strength to perform the work of bringing water to the surface, if only suit-

able means of directing its energy can be discovered.

The windmill is the best-known method of converting wind energy into work. In one form or another it has been used from times antedating the dark ages. In the twelfth century windmills, built either by individuals or by communities, were common. Some of these mills were of enormous size. In the German type the whole building on which the windmill was placed was constructed in such a manner as to turn on a post in order to bring the sails into the wind. In the Dutch form the building was fixed, but the head of the mill could be turned into the wind. The most notable use of these early mills was in Holland, where the land was drained by pumping water from behind the dikes into the sea. In 1391 the Bishop of Utrecht, holding that the wind of the whole province belonged exclusively to him, gave to the Convent at Windheim express permission to build a windmill wherever it was thought proper. In so doing he overruled a neighboring lord, who declared that the wind in the district belonged to him. Three years later the city of Haarlem obtained leave from Albert, Count Palatine of the Rhine, to build a windmill, using the wind of the country.

The huge, clumsy windmills of European make, such as that erected at Lawrence, Kan., shown in the accompanying plate, have within a few decades given place in this country to the light, rapidly running forms. Thousands of these have been made by various firms throughout the country. At first wood was used almost exclusively, but this is being rapidly displaced by metal, especially by thin steel plates and forgings. Although millions of dollars have been invested in the manufacture and purchase of mills and much attention has been given to the

mechanical details and the saving in weight and cost, yet comparatively little study has been bestowed upon the actual efficiency of the various forms and upon their development toward theoretical ideals.

platform. In the foreground is a small reservoir, divided by a bank in the area cultivated. Without windmills the cultivation of the tract of country middle, so that one part may be used independently of the other. The part



Dutch Windmill at Lawrence, Kansas.

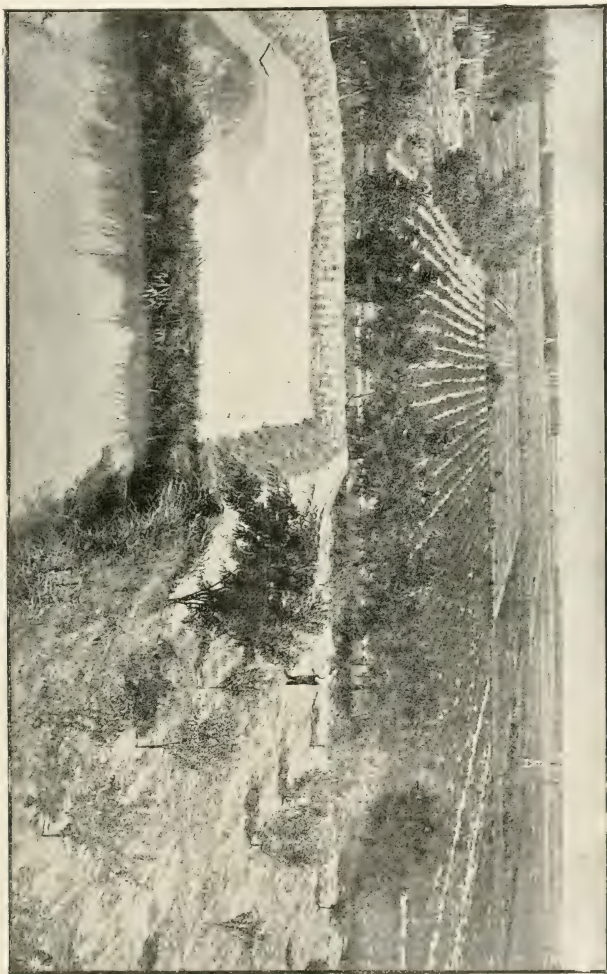
A view of gardens cultivated by water pumped by windmills is shown in the accompanying plate. This picture has been taken from a windmill

nearer the observer is the older; the second part is a recent addition rendered necessary by the increase of the shown in this picture would be impos-

sible. It is doubtful if a single cow could find subsistence on the area which now supports a family.

the adjacent ground. On this puddled earth the banks are built at a height of from 4 to 10 feet. These are

Reservoir and Garden



A section through one of these small reservoirs shows at the bottom the puddled earth or clay that prevents the water from seeping into

usually built by plowing and scraping up the earth from the outside, the tramping of the horses and the men serving to consolidate it. When the

bank has been built to the proper height it is smoothed and sodded. On the right-hand side of the figure is the pipe or wooden flume from the wind-mill and on the left-hand side is shown the outlet box, which is usually built of 2-inch plank. This is closed by some simple form of wooden gate or valve, either lifted by means of a screw or hinged so as to open outward, and is

held in place by the pressure of the water against it.

The square reservoir is the form usually adopted. The mills, as in the other cases, are placed on each side, pumping through short wooden flumes over the bank. These reservoirs are not only used for holding water for irrigation, but with a little care serve as ponds for raising fish.

COST OF RECLAMATION WORK

How Cost of Western Irrigation Work Compares with Like Work Elsewhere

ONE of the most surprising features connected with the work of the Reclamation Service, as well as the one affording highest gratification, is the cost of structures compared with those which have become familiar to engineers in the East.

When the reclamation work was inaugurated it was a matter of conjecture whether or not the standards of cost for dams, canals, etc., that had been established by engineering practice in the eastern part of the country, could be relied upon as a basis of estimates of the cost of the proposed western structures. As the work has progressed it has become more and more evident that many classes of engineering work in the west can be performed considerably cheaper than in the East, and at the same time the natural conditions are such that these structures are economical and effective.

If we take, for example, the three great masonry dams now being erected for the purpose of storing water, viz.: the Roosevelt dam in Arizona, the Pathfinder dam in southeastern Wyoming, and the Shoshone dam in northwestern Wyoming, we shall find that the effective storage capacity and costs are far below those of some of the great eastern dams like the New Croton in New York, and the Wachusett in Massachusetts. The heights of

these dams are as follows: Roosevelt, 280 feet; Pathfinder, 210 feet; Shoshone, 308 feet; New Croton, 297 feet, and Wachusett, 207 feet. These heights are measured from the foundation stones to parapet in each case, and they show that the Shoshone is the highest, while the New Croton is second and the Roosevelt third. If, however, the height above the river bed be considered, that is, the effective storage height, the New Croton is the lowest. The order is then as follows: Shoshone, 240 feet; Roosevelt, 230 feet; Pathfinder, 200 feet; Wachusett, 185 feet, and the New Croton, 157 feet. In other words, about 50 per cent of the masonry in the New Croton dam is below ground and is serviceable for foundation purpose only.

It is interesting to note the comparative reservoir capacities. While the New Croton dam is the largest in the world from the standpoint of its amount of masonry, the storage capacity of the reservoir formed by it is by far the lowest of any of those above mentioned. In fact, from a standpoint of storage economy, the New Croton reservoir is one of the poorest that has been constructed in recent years. The dam contains 833,000 cubic yards of masonry and was erected at a cost of \$7,600,000. The capacity of the reservoir formed by it is 4,000,000,000 cubic feet, or a cost of

\$1,900 per million cubic feet storage. Similar figures for the Wachusett dam show that it contains 280,000 cubic yards of masonry, and was erected at a cost of about \$2,000,000. Its storage capacity is 8,400,000,000 cubic feet, or a cost of \$238 per million cubic feet storage. In contrast to these excessive costs the three western dams appear remarkable. The Roosevelt dam, for example, contains 350,000 cubic yards of masonry erected at a cost of \$3,850,000. The capacity of the reservoir is 61,000,000,000 cubic feet, or fifteen times that of the New Croton, and about seven and one-half times that of the Wachusett. The cost of this dam per million cubic feet storage is only \$63.16. Even more remarkable appears the Pathfinder dam. It contains 53,000 cubic yards of masonry, erected at a cost of \$1,000,000. The capacity of the reservoir is 43,560,000,000 cubic feet, or more than ten times that of the Croton. The cost of the dam per million cubic feet storage is therefore only \$22.95 as against \$1,900 for the New Croton, and \$238 for the Wachusett. Similar figures for the Shoshone dam, the highest in the world, are: Cubic yards of masonry, 69,000; cost, \$1,000,000; capacity of reservoir, 20,000,000 cubic feet,

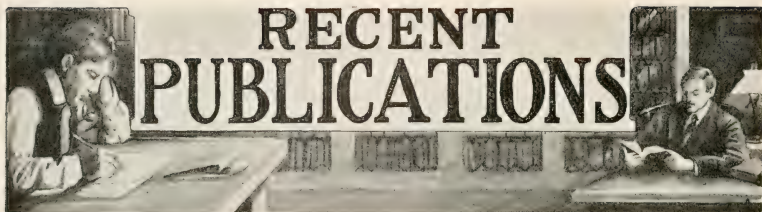
or a cost per million cubic feet storage of \$50.35.

These extremely low costs have seldom been equalled in the history of reservoir construction, and are due largely to the excellent natural facilities which are found in the rugged western country. From this fact it must not be inferred that these western structures are simple engineering works. On the contrary, owing to their isolated location, their inaccessibility by rail and often by wagon, and the erratic and torrential character of the streams, they involve problems which tax the skill and ingenuity of their builders to the utmost.

It is most fortunate that these reservoirs provide enormous storage at relatively low cost, otherwise their construction would not be feasible, as the irrigated land could not bear the expense of the costly structures of the East with their limited storage capacity.

The Croton dam, if it had been constructed in Salt River Valley in Arizona for irrigation, would only supply 23,000 acres, and irrigators would have to pay \$330 an acre for stored water, as against \$20, the estimated cost from the Roosevelt dam.





The Forester. A Practical Treatise on British Forestry and Arboriculture for Landowners, Land Agents, and Foresters. By John Nisbet, 2 Vols. Illustrated. Pp. 506-642. William Blackwood & Sons, Publishers, Edinburg.

This is in many ways the most important book on forestry that has yet appeared in English. As the author says in his preface, it is neither a reprint nor a revision of the work by John Brown, and Brown and Nisbet, which, under the same title has gone through six editions, but is an entirely new production. The general character of the book is indicated in its sub-title, and the broad distinction made between forestry and arboriculture is worth noting. The difference is too rarely recognized in this country.

The fact that the book is avowedly written from the British point of view, and for the guidance of British cultivators, limits its usefulness here in a very large measure; yet we have so few books on the subject in English that one is disposed to value this for the many important things it does contain. What does not apply may be overlooked.

In a lengthy introduction (Part I) are given an historical sketch of forestry and arboriculture in Britain, facts and statistics relative to British woodlands, and a discussion of forest influences and the economic value of forests. The last is of general application and interest, and brings together many facts not available to one who reads no language but English.

Part II considers individually the tree species of the British Isles, the large number that have been introduced as well as those that are native. The effort is made to describe each tree botanically, silviculturally, and economically, and while there is evidence of much painstaking, the statements made are often faulty. For instance, it is said of Douglas Fir, "the best wood comes from moderate elevations on the west slopes of the Rocky Mountains, and is of great durability." Even in the British part of its range the tree is best developed and produces the best timber west of the Cascade Mountains, and the wood is nowhere considered very durable. Again, it is said "The wood of the Scarlet Oak is of little value. It is so porous and open

of texture that even in America it is chiefly used for making staves for dry-goods barrels. It does not even make fair fire-wood."

With respect to common names there is the usual confusion: *Pinus sylvestris*, L. is Scots Pine, or Common Fir, *Acer Saccharinum* L. is "Soft Sugar or Bird's Eye Maple" and *Pseudotsuga Douglasii* Carr. is "Red Pine." The last name is used locally only in some parts of the Rocky Mountains, whereas Red Fir is the common name in the lumber trade.

Part III is devoted to silviculture and presents in a very satisfactory way the accepted European practices. An American is always dissatisfied with this part of every work on forestry, because the methods are based upon rules of practice instead of upon principles of universal application. It may be reasonably expected that before long American foresters will answer the need for a true system of silviculture based upon natural laws.

Part IV deals with the protection of woodlands from ill influences of every kind. The chief value of this section is in its suggestions because injury to forests and trees is so largely a question of local conditions.

Part V treats of forest management and Part VI of forest products. Both sections are written for the British practitioner, and consequently have a restricted value here. The theoretical principles of forest management are well presented, however, and one is glad to find the various formulæ for determining rotation, rate of increment, etc., in such convenient form. The tables in the appendix to Part V are especially valuable. What is said of the technical properties of timber is valuable as a compilation of the known facts, but the author himself doubtless realizes how little definite, exact knowledge there is on this subject. The chapters on forest utilization have little application here. The terminology frequently differs from that commonly used in the United States, and some words are worth adopting. *Felling*, for instance, in place of *cutting*.

To the American forest student this book comes as a boon and the professional will often want to refer to it. Numerous faults and many shortcomings might be pointed out, but as a whole the book will be found

almost indispensable. It is sparingly illustrated with good wood cuts and half-tone engravings, and is furnished with that indispensable in a hand-book—a good index.

A Working Plan for Forest Lands in Central Alabamb. Bulletin No. 68, U. S. Forest Service. By Franklin W. Reed. Pp. 72, with map and four half-tone plates. Washington, Government Printing Office, 1905.

Just at this time when the forest resources of the South are being discussed by reason of the pending Appalachian Forest Reserve Bill, this bulletin, although describing a section outside of the proposed reserve, is nevertheless quite interesting. The plan described was prepared for the Kaul Lumber Company, of Birmingham, for lands in Coosa, Bibb, and portions of adjacent counties.

Davey's Primer on Trees and Birds By John Davey, author of "The Tree Doctor." Pp. 163. Profusely illustrated. Published by the author. Sewickley, Pa.

This handsome little volume is written in popular vein and simple language, to be used as a school reader and generally as an elementary treatise on tree and bird life. The author has found that the most practical suggestions looking toward the proper preservation of tree and bird life is "to teach the child." The volume before us was undertaken purely with this idea in view, and should be a help in creating a proper sentiment toward trees and birds. The illustrations are many and exceedingly clear.

Neighbors of Field, Wood and Stream. By Morton Grinnell. Forty-five illustrations. Pp. 285. Frederick A. Stokes Co., Publishers, New York.

This volume contains a delightful series of stories about the commoner species of birds, beasts, and fish of the Eastern United States. It plans to make known to the younger generation the habits and home life of our wild neighbors. With the idea of giving the subject a real and living interest, he has endowed the birds and beasts described with human intelligence, which undoubtedly is an attractive way to present such matter to young readers. The illustrations are unusually pleasing and appropriate. Altogether it is a book well worth adding to one's collection.

A Guide to the Wild Flowers. By Alice Lounsberry. Illustrated by Mrs. Ellis Rowan. Pp. 347. Profusely illustrated with line drawings and colored plates. Fourth edition. Published by Frederick A. Stokes Co., New York.

In this work one gets as complete and accurate a guide in wild flowers as is obtainable in one volume. Its value is appreciated, as shown by the fact that the book has gone through four editions. The arrangement of the text throughout is one of great simplicity and clearness, while the many illustrations are a great aid to the identification of the various species described. We know of no more valuable and useful publication of a popular character devoted to the wild flowers.

A Guide to the Trees. By Alice Lounsberry. Pp. 313. Profusely illustrated. Published by Frederick A. Stokes Co., New York.

This is a companion volume to Miss Lounsberry's Guide to the Wild Flowers, and is uniform in arrangement, illustrations, and general makeup with the latter work. Its value lies in the same direction—simplicity, clearness of descriptions, and full enough to satisfy the most ambitious student of our leading trees. Nearly 200 trees are described, besides a number of shrubs. Its illustrations include 64 colored plates and many black and white drawings and diagrams by Mrs. Rowan, who also illustrated the volume on wild flowers. The volume also contains an introduction by Dr. N. L. Britton, Director of the New York Botanical Garden.

Hardy Rhododendrons, Azaleas, and the Mountain Laurel. By J. Woodward Manning. Manning's Monographs, March, 1906, No. 2. Pp. 36, illustrated.

From the Reading nurseries, at Reading, Mass., comes this excellent little booklet, pleasing in its typographical excellence and in contents. The plants are exhaustively described and directions for their care given.

The Fern Collector's Guide. By Willard Nelson Clute. Pp. 61. Illustrated. Frederick A. Stokes Co., New York.

This handy little book has been published with the idea of showing the student "where to find and how to name the ferns." It is most conveniently arranged for ready reference, and is enhanced in value by many excellent text illustrations. This guide is based upon the more extensive writings by same author, and should meet with a warm reception from fern collectors.

Silas Strong. A Novel. By Irving Bacheller. Pp. 339. Price \$1.50. Harper & Brothers, New York, 1906.

"Silas Strong," with the sub-title of "Emperor of the Woods," is a tale of life in the Adirondacks. Aside from a story that

would be entertaining no matter where the scenes were laid, the book contains a strong and reasonable plea for the preservation of the Adirondack forests. It shows the present tendency in the "Great North Woods" and the conflicting interests that are threatening the destruction of America's most beautiful playground. The people and legislators of New York especially, might read this book with profit to the state property.

Advice for Forest Planters in Oklahoma and Adjacent Regions. Bulletin No. 65, U. S. Forest Service. By Geo. L. Clothier, M. F. Pp. 46, illustrated. Government Printing Office, 1905.

This bulletin contains advice on the methods of planting trees, proper species for planting, care of planted trees, and general suggestions to forest planters in the region covered. The information here published has been collected by agents of the Forest Service chiefly in connection with the making and execution of forest planting plans for different land owners in the region, and was issued because it was felt there was a general lack of definite information regarding forest planting.

The Black Hills Beetle, With Further Notes on its Distribution, Life, History and methods of Control. Bulletin No. 56, Bureau of Entomology, U. S. Department of Agriculture. By A. D. Hopkins, Ph. D. Pp. 22, illustrated. Government Printing Office, 1905.

The Black Hills beetle has killed between 700,000,000 and 1,000,000,000 feet of western yellow pine timber in the Black Hills Forest Reserve, where it is found in abnormal numbers and lately its depredations in central Colorado and New Mexico have become extensive. The report here presented is the result of an investigation undertaken by Dr. Hopkins and his assistants, at the request of the Forest Service, and contains in addition to a description of the beetle, its habits and life-history, a method of control, devised and tested by Dr. Hopkins. The actual discovery of the beetle and its identification as a new species by Dr. Hopkins occurred in 1900. Owing to the serious nature of the beetle's depredations, it was felt that a full investigation should be undertaken to determine its character and extent, and the bulletin here presented is the final report of such investigation.

DEPARTMENT OF THE INTERIOR, Washington, D. C., May 8, 1906. Sealed proposals will be received at the office of the United States Reclamation Service, Billings, Montana, until 2 o'clock p. m., June 20, 1906, for the construction of about 17 miles of canal, involving approximately 350,000 cubic yards of excavation. Plans, specifications, and proposal blanks may be obtained from the Chief Engineer, Reclamation Service, Washington, D. C., or from the Engineer, Huntley, Montana. E. A. HITCHCOCK, Secretary.

DEPARTMENT OF THE INTERIOR, Washington, D. C., April 26, 1906. Sealed proposals will be received at the office of the United States Reclamation Service, at Mitchell, Neb., until 2 o'clock p. m., June 15, 1906, for the construction of about 135 miles of distributing system involving about 720,000 cubic yards of earth work and 11,000 cubic yards of rock work, for the irrigation of lands in the North Platte Valley in Western Nebraska. Particulars may be obtained from the Chief Engineer of the Reclamation Service, Washington, D. C., or the Engineer, Mitchell, Neb. E. A. HITCHCOCK, Secretary.

DEPARTMENT OF THE INTERIOR, Washington, D. C., April 26, 1906. Sealed proposals will be received at the office of the Supervising Engineer, United States Reclamation Service, Portland, Ore., until 3 o'clock p. m., June 28, 1906, for building the Cold Springs Dam, near Hermiston, Ore., including about 694,000 cubic yards of earth and gravel excavation, about 3,100 cubic yards of rock excavation, about 3,110 cubic yards of concrete, and about 35,000 cubic yards of rip rap and rock fill. Particulars may be obtained at the office of the U. S. Reclamation Service, at Washington, D. C., Portland, Ore., and Hermiston, Ore. E. A. HITCHCOCK, Secretary.

DEPARTMENT OF THE INTERIOR, Washington, D. C., April 23, 1906. Sealed proposals will be received at the office of the Supervising Engineer, United States Reclamation Service, Portland, Ore., until 2 o'clock p. m., June 27, 1906, for the following work: Storage works near Conconully, Wash., including about 258,000 cubic yards of earth excavation, 29,000 cubic yards of rock excavation, 160 feet of tunnel, and 2,360 cubic yards of concrete. Particulars

may be obtained at the offices of the U. S. Reclamation Service at Washington, D. C., Portland, Ore., and Pogue, Wash. E. A. HITCHCOCK, Secretary.

DEPARTMENT OF THE INTERIOR, Washington, D. C., April 21, 1906. Sealed proposals will be received at the office of the Reclamation Service near Belle Fourche, S. Dak., until 4 p. m., May 29, 1906, for the completion of the Main Supply Canal, Belle Fourche Project, South Dakota, from Station 80 to terminus, involving the excavation of approximately 200,000 cubic yards, more or less of material. Specifications, form of proposal and plans may be obtained from the Chief Engineer, United States Geological Survey, Washington, D. C., or from R. F. Walter, Engineer in Charge, Belle Fourche, S. Dak. E. A. HITCHCOCK, Secretary.

DEPARTMENT OF THE INTERIOR, Washington, D. C., May 12, 1906. Sealed proposals will be received at the office of the United States Reclamation Service, Klamath Falls, Ore., until 2 o'clock p. m., June 21, 1906, for the construction of 10 miles of canal, and 27 miles of laterals in Klamath County, Ore., with checks, turnouts, culverts, bridges and other appurtenances involving about 570,000 cubic yards of excavation, 1,550 cubic yards of concrete masonry, and about 35,000 feet B. M. of lumber. Plans, specifications and forms of proposal may be obtained by application to the Chief Engineer of the United States Reclamation Service, Washington, D. C., the Supervising Engineer, 1108 Union Trust Building, Los Angeles, Cal., or the Project Engineer, Klamath Falls, Ore. E. A. HITCHCOCK, Secretary.

DEPARTMENT OF THE INTERIOR, Washington, D. C., May 3, 1906. Sealed proposals will be received at the office of the Supervising Engineer, United States Reclamation Service, Portland, Ore., until 2 o'clock p. m., June 20, 1906, for the construction of about 25 miles of canal extending from the Umatilla River, near Echo, Ore., to the proposed Cold Springs Reservoir, consisting of the following work: About 700,000 cubic yards of earth excavation, about 6,000 cubic yards of rock excavation, about 2,200 cubic yards of concrete, and about 3,600 cubic yards of riprap, divided into two schedules. Particulars may be obtained at the offices of the United States Reclamation Service, Washington, D. C., and Portland, Ore. E. A. HITCHCOCK, Secretary.

Forestry and Irrigation

H. M. SUTER, Editor

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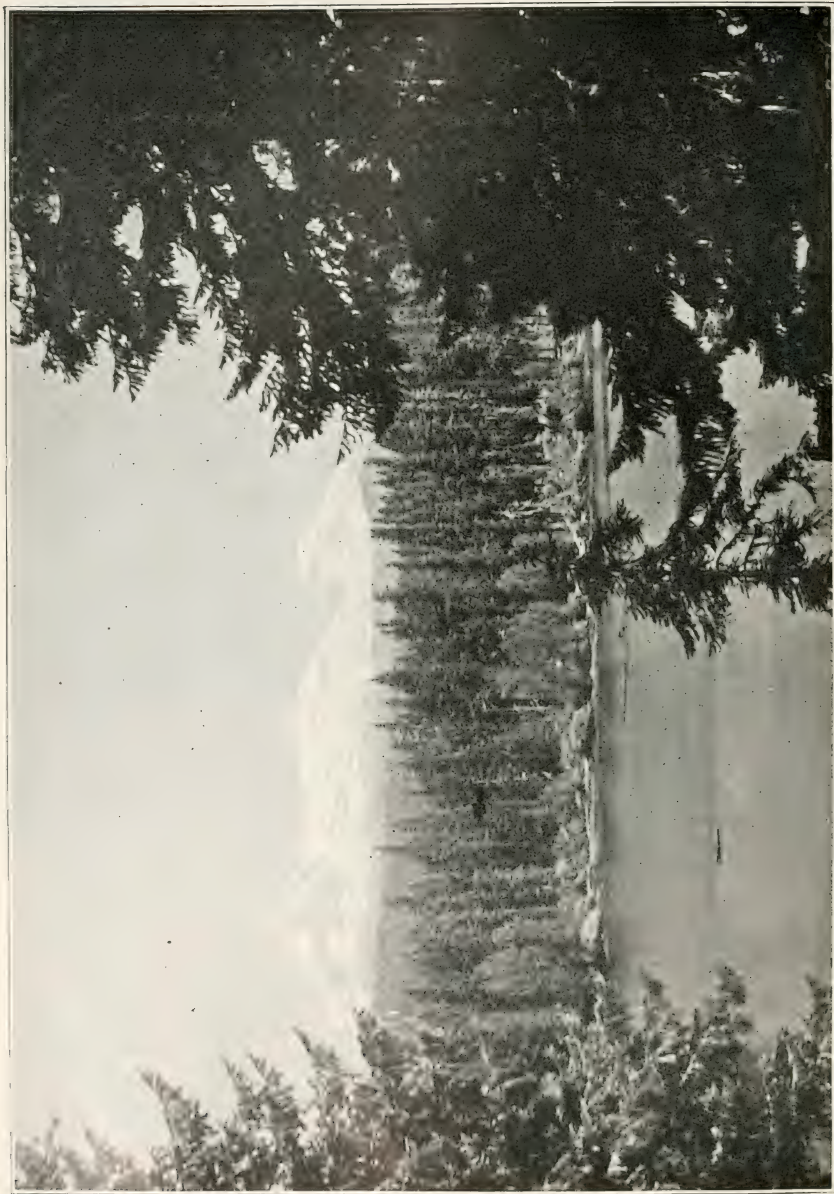
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JOHN

E. SHERIDAN



A Magnificent Forest and Mountain Scene. The Three Sisters, from Fish Lake, Cascade Forest Reserve, Oregon.
The timber is Alpine Fir and Bull Pine.



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JUNE, 1906.

No. 6

NEWS AND NOTES

Senate Passes Reserve Bill

On June 22, Senator Brandegee presented before the Senate the bill (S. 4953) for the purpose of acquiring lands for forest reserve purposes in the Southern Appalachian and the White Mountains of New Hampshire. The bill was passed without opposition. It authorizes the Secretary of Agriculture to procure lands for forest reserves in Maryland, Virginia, North Carolina, South Carolina, Georgia, Alabama and Tennessee in the Appalachian Mountains and in New Hampshire in the White Mountains. He is also authorized to accept donations of lands for forest reserves. The bill carries an appropriation of \$3,000,000.

This action marks a further big step in the work being carried on to preserve our Eastern forests. All energy should now be directed toward the House of Representatives at the next session of the present Congress. Never has there been a better outlook for the passage of this bill.

Membership Campaign

For the past year the American Forestry Association has been engaged in an active campaign to in-

crease its membership and influence. The success which has attended these efforts has been gratifying. A very substantial number of the persons invited to become members accepted, when the objects of the association were laid before them.

The association realizes that there never has been a time in the history of the forest movement in the United States when well-directed effort was so certain to achieve good results for forest protection as at present. Largely through it public opinion has been brought to bear on the agitation for the creation of the Southern Appalachian and White Mountain forest reserves, and it seems probable that Congress will take favorable action on the bill now before it. The success the organization has achieved in its varied efforts so far only emphasizes the desirability of extending its scope of operations and its influence throughout the country. This can only come through an increasing support in membership. The association desires and needs as members representative men and women in every city and town in the country. A very large proportion of persons in sympathy with the forest movement, or feeling

a patriotic interest in this great economic movement, would gladly render support to the cause if the matter were brought to their attention. The American Forestry Association is endeavoring to reach such persons all over the country, but it is certain that a very large number who would gladly accept membership are lost through inability to present to them the aims of the association.

Therefore the officers of the association submit this appeal to its members and friends: Lend your assistance in securing additional members. Forward to H. M. Suter, Secretary, 1311 G street northwest, Washington, D. C., the names of friends or acquaintances whom you think would be interested in forestry and the work of the American Forestry Association. Information will be gladly sent to all.

The Growing Forest Service

Some idea of the magnitude and variety of the operations of the United States Forest Service may be gained from one of the recent publications of that bureau, showing field assignments for June. In addition to the administrative work in connection with forest reserves, the service is prosecuting a very large number of examinations of lands for new forest reserves throughout the West. Special studies of specific phases of forestry are being pursued in a number of States. The problem of forest planting—particularly throughout the West—and the institution of nurseries for the propagation of seedlings has a prominent place in the work of the service. The preparation of planting plans for private owners occupies a number of its employees in a large number of States, and coöperative work with States, various other Governmental departments, municipalities, corporations, and individuals, is under way. The possibilities of treated timbers, experiments in preservation processes, and the strength of various timbers, is being investigated. Statistics relating to the consumption of for-

est products, etc., are being collected, and the publication section is constantly issuing publications and reports of various investigations. Improved methods of turpentineing are being pursued in Florida, in coöperation with a large corporation; experiments are being conducted in Massachusetts to determine the value of various woods for pulp; in Michigan the cross-tie problem is being studied, in coöperation with the Chicago and Northwestern and the Wisconsin Central railroad companies; in Pennsylvania, a preliminary study is being made to determine a forest policy for the Pennsylvania Railroad Company; and coöperation with the Reclamation Service is carried on largely throughout its field of operations.

Altogether forestry in the United States has already become an important economic factor. The rapidity of its progress is most evident in a comparison of Government and State activities and appropriations of the present and a half dozen years ago.

Rhode Island Forester

Jesse B. Mowry, who was recently appointed by Gov. George H. Utter commissioner of forestry for Rhode Island, is considered well qualified for the duties of the office, having made a long study of the subject. Mr. Mowry is a native of the town of Glocester and is superintendent of public schools in that place.

He received his early education in the schools of Glocester and took a course of study in the Rhode Island State Normal School. After leaving the Normal School he entered Norwich University, where he received the degree of Bachelor of Science and then entered Brown University where he took up the study of chemistry.

Leaving his studies in Brown University, he was appointed officer in charge of the barracks at Norwich University, where he served two years. He has taught schools in several places, has been sub-master of high schools in Massachusetts, a professor of botany and geology in Grand Is-

land College, Nebraska, and in the Leonard School of Pharmacy. In addition to his duties as superintendent of schools of Gloucester, Mr. Mowry is a member of the faculty of the Pentecostal Collegiate Institute, Scituate, and a member of the American Chemical Society.

In speaking of the opportunities and possibilities that lie in the unimproved and abandoned farms of Rhode Island, the new commissioner recently said:

"There are in this State about 268,000 acres of unimproved and abandoned farm land. Much of it has always been unsuitable for agriculture and a great deal of it has now reverted to forests. The shifting of the grain and meat producing industries westward has greatly lessened the requirements of tillage and pasture land in the State, but it is none the less important that the large area of unimproved land should be put to the best possible use.

"A great deal of the land is ledgy and some of it is so poor that it should be allowed to produce what it can naturally while more of it should prove remunerative if devoted to forest planting. The natural afforestation is slow and many times unsatisfactory. Twenty years and more elapse before the land is covered with trees and many of these are of the less valuable species. This delay is unnecessary and may be avoided by forest planting, and many instances to pine and hard woods at a small outlay, has produced four or five times as much valuable timber per acre in forty years as would have been produced by natural afforestation.

"The long investment discourages the planter, but he should keep in mind that the land so planted is increasing in value and is released from taxation for a period of fifteen years. In the rugged ridges, where forest planting would be unprofitable and where we now find the forests of evergreens mixed with hardwoods, forest management would greatly improve the

value. There is a very small percentage of the woodland in the State that is producing as large a money return as it is capable of doing. The imported pine, maple, oak and other woods range higher in price than native products because the latter has become inferior in quality and dimensions.

"The nation's supply of white pine, which is our most useful tree for commercial purposes, is fast decreasing, and the valleys of Rhode Island's many small rivers, which are too light and sandy for profitable tillage, form natural places for the best production of this species. The largest specimen in North America that I know of is found in the town of Gloucester, but within the past few years many acres of this land has been cut off. Very few if any of the mother trees are left and the land is growing up with birch, scrub oak and brush.

"With better laws to protect the planters from forest fires this area could be made again to yield a heavy growth of timber, and if taken in time under forestry methods the tree weeds now occupying the ground would serve as a shade and protection to the pine seedlings. In States like Michigan nature has produced only about 5,000 feet per acre of pine, while experiments in New England have proven that five times that amount can be grown per acre and harvested by the man who in youth plants the pine seed."

Forest Instructor Wanted

An assistant to the director of the recently created School of Forestry at Colorado Springs, Colo., is wanted. His duty will be to give elementary instruction in forestry. The salary will be \$1,200 a year, with a prospect for advancement if the work done is satisfactory. Applications for this position should be made to the Forester, United States Forest Service, Washington, D. C.

Irrigation in Hawaii

The Kohala Ditch, the biggest irrigation enterprise of the kind in the Hawaiian Islands, was opened June



Granite Knob in the Southern Appalachian Mountains from which the forest, and later the soil has been largely removed.



Badly Washed Mountain Valley Lands, Bakersville, N. C. The lower slopes bordering this valley are largely cleared.

11, with ceremonies, in which Secretary Atkinson, lately acting governor, took part. The ditch at present runs fourteen miles, of which nine are mountain tunneling, and it will eventually be seventy miles long and will supply 70,000,000 gallons of water per day to numerous plantations and to large areas of land which are now uncultivated through the lack of water. The ditch as far as at present constructed cost \$500,000. In the course of his address at the opening of the ditch, Secretary Atkinson quoted a letter from President Roosevelt, in which the latter pledges his support to efforts to secure immigrants who will settle on the lands of Hawaii. The President in his letter, which was addressed to Mr. Atkinson while the latter was acting governor, says that he will do all in his power to assist in the matter.

**Lower
Yellowstone
Project**

Public interest in national irrigation has been heightened by the progress of the work on the Lower Yellowstone reclamation project. This project in eastern Montana and western North Dakota contemplates the reclamation of 67,000 acres of land, two-thirds of which is in Montana. The canal takes its supply from the Lower Yellowstone River at a point about seventeen miles below Glendive, and extends down the left or west side of the river at total length of 80 miles.

Contracts have been awarded and construction is now proceeding on all but one of the divisions of this work. Bids were recently opened for constructing the main diverting dam across the river. This will be a timber crib and rock structure 600 feet long and 12 feet in height. It will serve to divert the low flow of the Yellowstone River into the main canal. The canal when completed will have a capacity of 1,700 acre-feet of water every twenty-four hours.

The initiation of the work has started a boom in real estate all over the valley. A great many new settlers have already arrived and others are

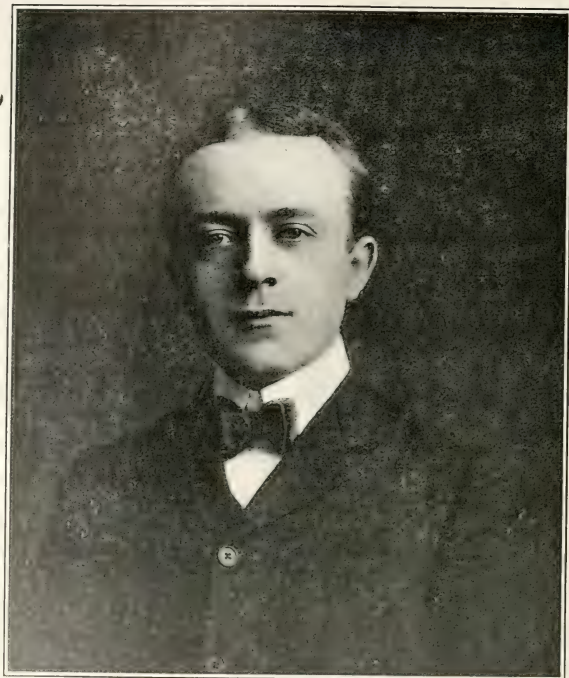
coming in every day. Many new buildings have been erected and others are in process of construction. Land for which there was very little sale at any price is now selling at \$25 and upward an acre.

**Progress
on Huntley
Work**

The Huntley irrigation project on the ceded portion of the Crow Indian Reservation, Mont., is attracting a great deal of attention just now by reason of the opening of the reservation to settlement under the general land laws on August 15.

Although no definite arrangements have been made as to the method of opening the land under the irrigation project, it is probable that some similar form of drawing will be adopted as heretofore used in connection with the opening of other lands. Contracts have been awarded and construction is being rapidly pushed on all the work of the Huntley project. It is expected that the land under the irrigation system will be opened to settlement within a few months.

This project, which embraces approximately 50,000 acres, has a maximum length of thirty miles and extends along the right bank of the Yellowstone River, excepting at a point twelve miles east of Billings. It is traversed throughout its entire length by the Northern Pacific Railroad, and is crossed by the Chicago, Burlington and Quincy. Both of these railroads are arranging to establish stations every five miles, which will give the settlers under this project exceptionally good railroad and shipping facilities. Arrangements are also being perfected by the Reclamation Service for availing of the benefits of the recent town site bill passed by Congress whereby a small tract of land conveniently located and surrounding the railway stations can be subdivided and sold to settlers and others. By this arrangement each farm unit will have stores, post-office, schools, and churches within an average of less than two miles.



MR. WESLEY J. GARDNER

Whose death removes an able member from the United States
Forest Service

Mr. Wesley J. Gardner, Forest Assistant in the Forest Service, died at the Episcopal Eye, Ear, and Throat Hospital in Washington, D. C., on June 15th. Mr. Gardner was born in Plainfield, N. J., January 30, 1871. He graduated from Harvard University in 1900 with an A. B. degree, and from Yale Forest School in 1903. His connection with the Forest Service dates from 1900, during which time he has been engaged in important investigations in various Western States. Conscientious devotion to his work and a quiet, refined manner were his characteristics at all times. His early death will be a life-long regret to his many friends and a serious loss to the Service.

EARTHQUAKES AND THE FOREST*

BY

MYRON L. FULLER

United States Geological Survey.

THE question of the relation of earthquakes to the forest is particularly pertinent at this time when the public interest, aroused by the recent terrifying shock and appalling conflagration at San Francisco, is still at a high pitch. In the accounts of the destruction wrought by these great convulsions of nature, little is usually said of the effect of the disturbances on the forest growth. Nevertheless, there is hardly a shock, at least of the severe ones, which does not affect it to a greater or less extent. In some instances the havoc wrought is both widespread and complete.

Earthquake waves may be popularly divided into (1) vibrations and (2) actual visible waves like the broad low swells of the ocean. The former are felt as relatively sharp and sudden jars, or shakings of the ground, while during the passage of the latter the earth is felt to rise, sway, and fall with the sickening motion so vividly impressed upon everyone who has experienced it. The sharp vibrations are often destructive to artificial structures, chimneys being snapped off, masonry walls parted and shattered, and buildings jarred from their foundations. To the larger earth waves are to be ascribed most of the twistings of the surface, the warping and folding of the ground, the fissuring of the soil, and the slipping of the hillside materials, as well as the destruction of buildings and other works of man.

Usually, however, the vibrations are not sharp enough to seriously affect the forests, although in the case of certain of the heavier shocks trees are said to have been snapped off short near their butts, but the landslides arising from the larger waves, aided

perhaps by the vibrations, are often very destructive to the trees of the steeper hill-sides. Not only are the trees directly overthrown by the shock, but by the warping of the surface and the formation of swamps and lakes through the obstruction of drainage, large numbers are often killed by submergence. Of our three greatest earthquakes—the famous New Madrid earthquake which shook the Mississippi valley in 1811 and 1812, the Charleston earthquake of 1886, and the San Francisco of April 18th of this year—only the former had a marked effect on the forests. At Charleston, notwithstanding the severity of the shock, there was almost no effect on the trees, which remained upright and unbroken. In the San Francisco region, the action was somewhat greater, the trees of the slopes and hill-sides often being tilted and overthrown by slippings started by the shock, but on the whole the forests were but little affected. Not so, however, was it in the case of the New Madrid area in which, as described in the following paragraphs, the destruction was great.

New Madrid, from which the earthquake of 1811-1812 was named, is a small town on the banks of the Mississippi in southeastern Missouri not far from the Arkansas line. It was near here that the earthquake reached its maximum intensity, but its area of destruction reached westward to the St. Francis River, eastward into Tennessee, and southward nearly to the present site of Memphis. The first shock was felt at 2 A. M. on December 16, 1811, being sufficient to awaken the settlers and to cause them to rush to the open to escape the falling chimneys and other objects. Here they re-

*Published by permission of the Director of the United States Geological Survey.

mained until morning, when a second shock, much heavier and more destructive than the first, brought renewed consternation upon them. This shock, according to an observer, was preceded by a rumbling like distant

thunder. A moment later "the earth began to totter and shake so that persons could neither stand nor walk. Then the earth was observed to roll in waves a few feet high with visible waves between. By and by these

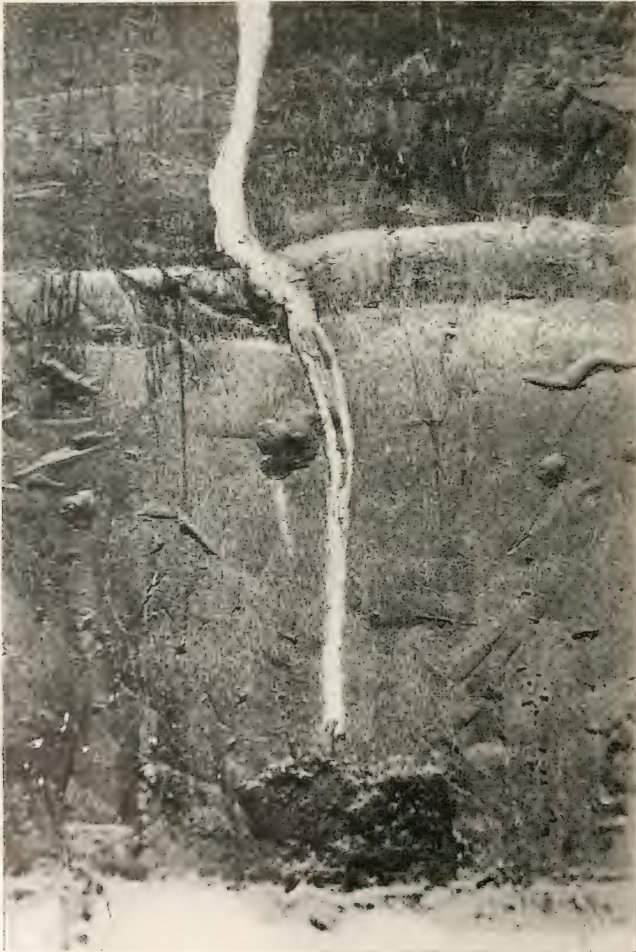


Fig. 1—Earthquake crack filled with sand forced up from below during New Madrid earthquake, Charleston, Mo. (Photo loaned by Mr. Thomas Beckwith.)

swells burst, throwing up large volumes of water, sand, and coal [lignite] (Fig. 1). When the swells burst, fissures were left running in a northern and southern direction and parallel for miles." After the severest shocks a dense black "sulphurous" vapor, due to gases derived from long buried timber and vegetable muck and issuing from the cracks, tainted the water for many miles around. From the cracks

The fowls and beasts cried; trees fell." Again speaking of a shock on February 7th, the same observer says: "At first the Mississippi seemed to recede from its banks, its waters gathered up like mountains, leaving boats high upon the sands. The waters then moved inward with a front wall 15 to 20 feet perpendicular. * * * The river fell as rapidly as it had risen and receded within its banks with such



Fig. 2—View in sunk Lands formed by New Madrid Earthquake southeastern Missouri, showing old timber in foreground, mostly killed by submergence, with young timber in background.

there were also thrown out sand and water which covered the ground over large areas. The surface sunk in places, giving rise to swamps and lakes, while elsewhere it was uplifted and its bayous drained. (Fig. 2.)

The effect on the forests has been described by many observers. One, speaking of the first shock, says "the affrighted inhabitants ran to and fro.

force that it took with it the grove of cottonwood trees which hedged its borders. They were broken off with such regularity that in some instances persons who had not witnessed the fact could with difficulty be persuaded that it was not the work of art."

Another writer, speaking of the cracks, says, "oak trees would be split in the center and for 40 feet up the

trunk, one part standing on one side of a fissure, the other part on the other.

* * * Near the St. Francis River there is a great deal of sunk land caused by the earthquake of 1811. Here are large trees sunk 10 or 20 feet beneath the water. * * * In Reelfoot Lake [Tennessee] the fisherman floats his canoe above the branching submerged tops of cypress trees." These submerged trees after strug-

the cottonwood trees cracking and crashing, tossing their arms to and fro as if sensible of their danger, while they disappeared beneath the flood." Still another says the "roaring and whistling produced by the impetuosity of the air escaping from confinement, seemed to increase the horrid disorder of trees being blown up, cracked and split and falling by thousands at a time."



Fig. 3—Trees tilted by landslides caused by New Madrid Earthquake. Reelfoot Lake, Tennessee

gling with the changed conditions for the most part finally died and their bare trunks may still be seen among the younger growth of cypress which is now taking possession of the old swamps. On the Mississippi, according to another observer, "The sandbars and points of islands gave way, swallowed up in the tumultuous bosom of the river, carrying down with them

Still another prominent source of destruction was the landslides occurring along the steep Chickasaw Bluffs which border the Mississippi lowlands on the east in Kentucky and Tennessee. These bluffs, consisting of more or less clayey deposits, were already nearly as steep as the material could stand and needed only the shock of the earthquake to inaugurate the slip-

ping. The face of the bluff literally crumbled under its action; wide rents opened and great masses slipped and slid downward, carrying with them the immense trees which covered the surface, and mingling both earth and timber in confused jumbles at the bottom. Two of the present views (Figs. 3 and 4) show trees overthrown by the slides at this time. In one the original trees survived, gradually straight-

ered an area of 25 miles long and 5 miles wide. Originally a small stream, known as Reelfoot Creek, flowed through the region, but at the time of the earthquake the land was upheaved across the lower portion and the waters dammed back to form the great lake, now so well known from the large quantities of fish taken from it each year. The region at the time of the shock was well wooded, much of

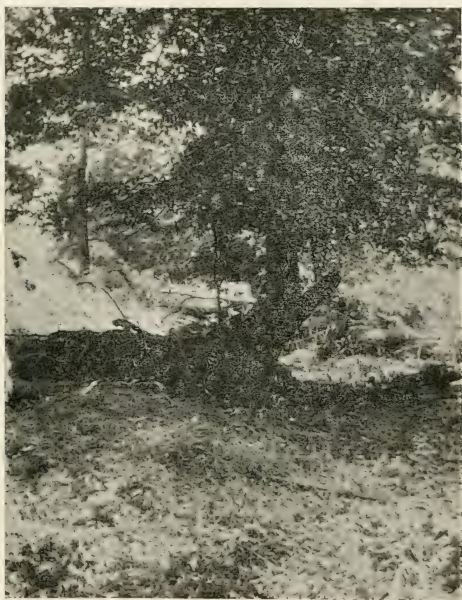


Fig. 4—Tree overturned and partly killed by New Madrid Earthquake, Reelfoot Lake, Tennessee

ening to an upright position; in the other the old broken trunk is decayed and gone, the present tree being developed from one of the original limbs.

Of all the causes of destruction which have been enumerated, that caused by the submergence of the land was most widespread. The most important single instance was the formation of Reelfoot Lake, which cov-

it being covered with species characteristic of dry situations. Over a large part of the area the timber remained upright after the shock, but was gradually killed by the rising waters. In Figure 5 is shown a view of such timber standing in about 15 feet of water. Elsewhere, however, the timber was prostrated, forming a network of trunks, which even now can be seen



Fig. 5—Timber killed by submergence due to New Madrid Earthquake. Reelfoot Lake, Tennessee

beneath the waters of the lake, or, as shown in Figure 6, projecting slightly above its surface.

Briefly summarizing the results of the earthquake on the forest, we find that its effects included the splitting of



Fig. 6—Timber prostrated and submerged by New Madrid Earthquake. Reelfoot Lake, Tennessee

trunks, the inclination of trees and interlocking of branches, the prostration of considerable tracts of forest, the snapping off of the trunks by the rush of waters near the Mississippi, the precipitation of trees into the streams by caving banks, the complete uprooting and removal of the entire vegetable covering of many of the islands (which themselves, in some instances, were completely destroyed), the overturning and prostration by landslides, and the submergence of great areas by ponded waters.

Over how great an area the forests were destroyed is difficult to say at the present time. Reelfoot Lake alone probably covered 125 square miles of

forest, while the swamps formed at this time to the west of the Mississippi probably covered 75 square miles or more in addition. These two causes alone would account for the destruction of over 125,000 acres. The amount of timber lost by the caving of the banks and by the overwhelming of the islands would probably bring the total to 150,000 acres. To this still further additions must be made of the areas in which the timber was overthrown by landslides or other causes. No estimate of this can now be made, but it was undoubtedly considerable. That the destruction was sufficient to give earthquakes a place among the enemies of the forest can not be disputed.

AGRICULTURAL SETTLEMENT IN FOREST RESERVES

Important Law Enacted by Congress Affecting Settlers in Reserves

BY

GEORGE W. WOODRUFF

In Charge of Section of Law, United States Forest Service.

THE enemies, and even the more critical friends, of forest reserves have harped upon the fact that, no matter how much care is exercised in choosing forest reserve boundaries, it is impossible to avoid the inclusion of land actually valuable for agriculture. Those who are hostile to the reserves declare that these areas are large and valuable, and that their inclusion in the forest reserve takes away from the people a much-desired opportunity to build homes and thriving communities. Fair-minded critics, on the other hand, although they admit that the tracts are small and isolated, have deplored the necessity of withholding any purely agricultural land from use by homestead settlers.

The Forest Service aimed to remedy this difficulty in the past by issuing

permits to cultivate agricultural areas, not exceeding 40 acres, to any person who would actually live upon and cultivate such tracts. In addition it allowed such permittees to take, without charge, sufficient forest reserve timber for fences and buildings in connection with the enjoyment of the agricultural privilege. Recently the Secretary of Agriculture has approved a regulation to take effect July 1, that such agricultural permits may be allowed by the Forester to the maximum of 160 acres. By this means, those willing to make their homes in the forests, were and are offered an opportunity to do so.

There was one drawback, however, namely that such permittees lacked one great incentive to improve their homes to the utmost. It was impos-

sible under the land laws to obtain title to forest reserve land, and they hesitated about planting orchards or even building thoroughly comfortable homes for fear that in the future, either through whim or through needing the land for administrative purposes, the Forester might revoke their permits and eject them from the reserve. The Forester was so keenly alive to this hardship and deterring influence that he recommended to Congress, even before the forest reserves were transferred to his care, that a law be passed to give opportunity, under reasonable restrictions, for acquiring the title to forest reserve lands chiefly valuable for agriculture. A bill to this effect was introduced in the Second and again in the Third Session of the Fifty-eighth Congress, but failed of passage. Last winter, however, Mr. Lacey reintroduced the bill and accepted several valuable amendments suggested by the Forester and by local interests. In its amended form the bill was finally signed by the President June 11, 1906. It reads as follows:

Be it enacted, etc., That the Secretary of Agriculture may, in his discretion, and he is hereby authorized, upon application or otherwise, to examine and ascertain as to the location and extent of lands within permanent or temporary forest reserves, except the following counties in the State of California: Inyo, Tulare, Kern, San Luis Obispo, Santa Barbara, Ventura, Los Angeles, San Bernardino, Orange, Riverside, and San Diego; which are chiefly valuable for agriculture, and which, in his opinion, may be occupied for agricultural purposes without injury to the forest reserves, and which are not needed for public purposes, and may list and describe the same by metes and bounds, or otherwise, and file the lists and descriptions with the Secretary of the Interior, with the request that the said lands be opened to entry in accordance with the provisions of the homestead laws and this Act.

Upon the filing of any such list or description the Secretary of the In-

terior shall declare the said lands open to homestead settlement and entry in tracts not exceeding one hundred and sixty acres in area and not exceeding one mile in length, at the expiration of sixty days from the filing of the list in the land office of the district within which the lands are located, during which period the said list or description shall be prominently posted in the land office and advertised for a period of not less than four weeks in one newspaper of general circulation published in the county in which the lands are situated: *Provided*, That any settler actually occupying and in good faith claiming such lands for agricultural purposes prior to January first, nineteen hundred and six, and who shall not have abandoned the same, and the person, if qualified to make a homestead entry, upon whose application the land proposed to be entered was examined and listed, shall, each in the order named, have a preference right of settlement and entry: *Provided further*, That any entryman desiring to obtain patent to any lands described by metes and bounds entered by him under the provisions of this Act shall, within five years of the date of making settlement, file, with the required proof of residence and cultivation, a plat and field notes of the lands entered, made by or under the direction of the United States surveyor-general, showing accurately the boundaries of such lands, which shall be distinctly marked by monuments on the ground, and by posting a copy of such plat, together with a notice of the time and place of offering proof, in a conspicuous place on the land embraced in such plat during the period prescribed by law for the publication of his notice of intention to offer proof, and that a copy of such plat and field notes shall also be kept posted in the office of the register of the land office for the land district in which such lands are situated for a like period; and further, that any agricultural lands within forest reserves may, at the discretion of the Secretary, be surveyed by metes and bounds, and

that no lands entered under the provisions of this Act shall be patented under the commutation provisions of the homestead laws, but settlers, upon final proof, shall have credit for the period of their actual residence upon the lands covered by their entries.

Sec. 2. That settlers upon lands chiefly valuable for agriculture within forest reserves on January first, nineteen hundred and six, who have already exercised or lost their homestead privilege, but are otherwise competent to enter lands under the homestead laws, are hereby granted an additional homestead right of entry for the purposes of this Act only, and such settlers must otherwise comply with the provisions of the homestead law, and in addition thereto must pay two dollars and fifty cents per acre for lands entered under the provisions of this section, such payment to be made at the time of making final proof on such lands.

Sec. 3. That all entries under this Act in the Black Hills Forest Reserve shall be subject to the quartz or lode mining laws of the United States, and the laws and regulations permitting the location, appropriation, and use of the waters within the said forest reserves for mining, irrigation, and other purposes; and no titles acquired to agricultural lands in said Black Hills Forest Reserve under this Act shall vest in the patentee any riparian rights to any stream or streams of flowing water within said reserve; and that such limitation of title shall be expressed in the patents for the lands covered by such entries.

Sec. 4. That no homestead settlements or entries shall be allowed in that portion of the Black Hills Forest Reserve in Lawrence and Pennington counties in South Dakota except to persons occupying lands therein prior to January first, nineteen hundred and six, and the provisions of this Act shall apply to the said counties in said reserve only so far as is necessary to give and perfect title of such settlers or occupants to lands chiefly valuable

for agriculture therein occupied or claimed by them prior to the said date, and all homestead entries under this Act in said counties in said reserve shall be described by metes and bounds survey.

Sec. 5. That nothing herein contained shall be held to authorize any future settlement on any lands within forest reserves until such lands have been opened to settlement as provided in this Act, or to in any way impair the legal rights of any bona fide homestead settlers who has or shall establish residence upon public lands prior to their inclusion within a forest reserve.

To prepare the Forest Supervisors for the rush of applications, which was likely to follow the passage of this bill, and to inform the public of the first steps to be taken toward having agricultural lands examined, classified, and listed preparatory to opening them for settlement and entry, the Forester issued the following general instructions:

To Forest Officers in Charge:

In order that you may be prepared to perform your duties under the Agricultural Settlement Act of June 11, 1906, you will please notice:

1. That the Secretary of Agriculture may use his discretion about examining and listing lands under the law.

2. Only lands chiefly valuable for agriculture and not needed for administrative purposes by the Forest Service or for some other public use will be classified and listed under this Act.

3. Land covered with a merchantable growth of timber will not be declared agricultural, except upon the strongest evidence of its value for agricultural purposes, both as to production and accessibility to a market.

4. Areas known to have been occupied by actual settlers prior to January 1, 1906, will be examined first, and when such areas are found chiefly valuable for agriculture they will be listed, in order that the occupants may make entry under the Act. The mere

fact that a man has settled upon land will, however, not influence the decision with respect to its agricultural character.

5. Any one who was a *bona fide* settler on land within a forest reserve before January 1, 1906, but who has already exercised or lost his homestead privilege, may, if otherwise qualified, make homestead entry under the provision of the proposed law, but must pay \$2.50 per acre for any lands entered.

6. The first preference right to enter lands classified and listed under the Act will be given to persons who settled upon such lands prior to January 1, 1906. The second preference right to enter any particular listed tract will be given to persons who apply to have the classification made, but this latter class should not apply for the classification of a tract occupied by a settler before that date; otherwise, they might lose their preference rights.

7. Supervisors are often absent from their headquarters, and so can not be reached at all times with equal certainty by all applicants. To avoid any undue advantage of one applicant over another due to this cause, all applications under this Act must be forwarded by mail to the Forester, Washington, D. C., by the applicants.

8. Applications dated and mailed before the bill had become a law will have no value and the Forester will return them at once, notifying the sender that he may apply again.

9. All applications received in Washington in the same mail for the examination of the same tract will be treated as simultaneous, and simultaneous applicants will be notified. A similar notice will be given to the later of two applicants for the examination of the same tract.

10. No examination of more than one quarter-section will be ordered upon the application of the same person, but if an application is withdrawn or rejected a second application will be received for other land.

11. All applications must give the name of the forest reserve and describe the land, examination of which is requested, by legal subdivisions, section, township, and range, if surveyed, and if not surveyed, by reference to natural objects, streams, or improvements with sufficient accuracy to identify the land.

12. Forest officers must not make application for the examination and listing of lands under this Act.

13. Instructions governing the allowance of entries to be made under the Act after the listing will be issued by the Interior Department.

14. When notified that the bill has become a law the Supervisors should inform the public as fully as practicable.

15. The Act expressly provides that no settlement on any lands within forest reserves is authorized until they have been publicly declared open to settlement by the Secretary of the Interior. Any settlement on such lands prior to the opening by the Secretary of the Interior will not only confer no rights on the settler but will constitute trespass.

16. You will please be diligent in discovering and preventing any such trespasses and report them promptly to the Forester.

17. Please give the widest possible publicity to this order to discourage such settlement and to prevent loss and trouble to intending settlers.

It will be impossible, with the official force and funds at the Forester's command, to list agricultural land within forest reserves as soon as the applicants may wish. The first effort will be to place people who were actually living within the reserve on January 1, 1906, and who are technically trespassers, in the proper position by examining and listing their lands, if they are found chiefly valuable for agriculture. Thereafter all purely agricultural lands within forest reserves will be brought within the reach of would-be homestead settlers as soon as practicable. There is some danger that

hostile critics may carp at the necessary delay, but within a reasonable time we may hope to see all forest reserve lands which is suitable for homemaking, occupied by thrifty families.

It is hoped and believed that these settlers will find that their own best interests are bound up in the protection of the forest reserves from fire

and trespass, and that they will become a great supplementary and volunteer ranger force, helping to protect and improve the reserves, and ultimately finding employment and a market for their farm products in the lumber and wood industries, which will soon and continuously be carried on within the National forests.

IMPORTANT IRRIGATION LEGISLATION

Bills Passed by Congress Which Affect the Working of the Reclamation Act

ON JUNE 18, the Senate adopted the conference report on what may be called a sort of Omnibus Bill relating to the Reclamation Act. The bill (H. R. 18536) is entitled, "An Act providing for the subdivision of lands entered under the Reclamation act, and for other purposes."

The first section provides that the Secretary of the Interior may establish farm units of not less than ten nor more than 160 acres whenever by reason of market conditions and the special fitness of the soil and climate for the growth of fruit and garden produce under a project, a smaller area than forty acres may be sufficient for the support of a family.

This corrects a serious defect in the original Reclamation Act, which made the smaller limit of the homestead entry forty acres. In many cases, such as projects in the southern part of the country, or projects elsewhere, when the conditions of soil and climate were favorable to fruit and the higher grade of products, a farm of forty acres is far more than would be necessary for the support of a family, and, indeed, too great an area for one man to properly irrigate under the intensive form of cultivation necessary to produce the more valuable crops.

This section also permits the Secretary of Interior to have the necessary subdivision surveys of the public lands for farm units less than forty acres made by the Reclamation Service.

Section 2 provides that whenever it has been necessary under the provisions of the Reclamation Act to acquire by relinquishment lands covered by a bona fide unperfected entry, the entryman may be permitted to make another entry as though his former entry had not been made.

This meets a condition, which in some cases is a hardship upon a settler who might otherwise lose his homestead right, because the land included in his entry is necessary for a reclamation project.

The Secretary of the Interior has already decided that under certain conditions an entryman, who is required to give up his land, could make another entry. This proposed act bases the right of the entryman upon a statute rather than upon the interpretation of the Secretary of the Interior.

Section 3 provides that townsites which have been set apart by the President under the provisions of Sections 2380 and 2381 of the United States Revised Statutes, within or near any reclamation project may be

disposed of under the provisions of the recent townsite act of April 16, 1906.

The necessity for this legislation is due to the fact that the Commissioner of the General Land Office had no funds available for the disposition of certain townsites withdrawn under the Minidoka project in pursuance of a proclamation of the President under these sections of the Revised Statutes. Bills have been introduced at the present session of Congress for the necessary appropriations, but have not yet passed and there was much urgency for the disposition of these townsites.

Section 4 provides that in two of the townsites on the Minidoka project, which had been withdrawn, namely, Heyburn and Rupert, settlers who have established themselves thereon prior to March 5, 1906, in permanent buildings not easily moved, shall be permitted to purchase the lots built upon at an appraised valuation for cash.

The conference report adds a provision that the limitation of townsites in connection with reclamation projects in the recent act of April 16, 1906, to 160 acres, shall be repealed. This will enable the Secretary of the Interior to make withdrawals of townsites of such size as in his opinion the public interest may require.

A townsite of 160 acres is very small for such large areas as are involved in a number of projects, when the country was not settled upon at the time of the beginning of the project. The proposed modification of the townsite act will enable the Secretary of the Interior to provide adequate townsite facilities in many cases where, under the act as it now stands, townsites of 160 acres would be entirely insufficient.

Section 5 provides that desert land entrymen, whose lands may be included in a reclamation project, and who may be directly or indirectly hindered or prevented from making improvements and reclaiming the lands under the desert land act, shall

be allowed an extension of time equal to the loss on account of such hindrance. It also provides that desert land entrymen within reclamation projects which are undertaken shall relinquish all lands embraced within the entry in excess of 160 acres, and as to such 160 acres they may make final proof and obtain patent upon compliance with the terms of the Reclamation Act. The section, however, does not require a desert land entryman, who owns a water right and reclaims the land embraced in his entry, to accept the conditions of the Reclamation Act.

The Representatives of the House and Senate having agreed upon this bill and the report having been adopted by the Senate, it is probable that it will likewise be adopted by the House and may therefore soon become a law.

While there may be features in this act that cannot be regarded as legislation of the wisest character, yet there are many provisions corrective of the defects in previous acts which are very valuable, and will undoubtedly aid in the successful application of the Reclamation Act to the construction of projects and the reclamation of the desert lands.

A copy of the act as agreed upon by the conferees follows:

An Act providing for the subdivision of lands entered under the Reclamation Act, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That whenever, in the opinion of the Secretary of the Interior, by reason of market conditions and the special fitness of the soil and climate for the growth of fruit and garden produce, a lesser area than forty acres may be sufficient for the support of a family on lands to be irrigated under the provisions of the Act of June 17, 1902, known as the Reclamation Act, he may fix a lesser area than forty acres as the minimum entry and may establish farm units of

not less than ten nor more than one hundred and sixty acres. That wherever it may be necessary, for the purpose of accurate description, to further subdivide lands to be irrigated under the provisions of said Reclamation Act, the Secretary of the Interior may cause subdivision surveys to be made by the officers of the reclamation service, which subdivisions shall be rectangular in form, except in cases where irregular subdivisions may be necessary in order to provide for practicable and economical irrigation. Such subdivision surveys shall be noted upon the tract books in the General Land Office, and they shall be paid for from the reclamation fund: Provided, That an entryman may elect to enter under said Reclamation Act a lesser area than the minimum limit in any State or Territory.

SEC. 2. That wherever the Secretary of the Interior, in carrying out the provisions of the Reclamation Act, shall acquire by relinquishment lands covered by a bona fide unperfected entry under the land laws of the United States, the entryman upon such tract may make another and additional entry, as though the entry thus relinquished had not been made.

SEC. 3. That any town site heretofore set apart or established by proclamation of the President, under the provisions of sections 2380 and 2381 of the Revised Statutes of the United States, within or in the vicinity of any reclamation project, may be appraised and disposed of in accordance with the provisions of the Act of Congress approved April 16, 1906, entitled "An Act providing for the withdrawal from public entry of lands needed for town-site purposes in connection with irrigation projects under the Reclamation Act of June 17, 1902, and for other purposes;" and all necessary expenses incurred in the appraisal and sale of lands embraced within any such town site shall be paid from the reclamation fund, and the proceeds of the sales of such lands shall be covered into the reclamation fund.

SEC. 4. That in the town sites of Heyburn and Rupert, in Idaho, created and surveyed by the Government, on which town sites settlers have been allowed to establish themselves, and had actually established themselves prior to March 5, 1906, in permanent buildings not easily moved, the said settlers shall be given the right to purchase the lots so built upon at an appraised valuation for cash, such appraisalment to be made under rules to be prescribed by the Secretary of the Interior.

Providing that the limitation on the size of town sites contained in the act of April 16, 1906, entitled "An Act providing for the withdrawal from public entry of lands needed for town-site purposes in connection with irrigation projects under the Reclamation Act of June 17, 1902, and for other purposes," shall not apply to the town sites named in this section and whenever, in the opinion of the Secretary of the Interior, it shall be advisable for the public interest, he may withdraw and dispose of town sites in excess of 160 acres under the provisions of the aforesaid act approved April 16, 1906, and reclamation funds shall be available for the payment of all expenses incurred in executing the provisions of this act, and the aforesaid act of April 16, 1906, and the proceeds of all sales of town sites shall be covered into the reclamation fund.

SEC. 5. That where any bona fide desert-land entry has been or may be embraced within the exterior limits of any land withdrawal or irrigation project under the Act entitled "An Act appropriating the receipts from the sale and disposal of public lands in certain States and Territories to the construction of irrigation works for the reclamation of arid lands," approved June 17, 1902, and the desert-land entryman has been or may be directly or indirectly hindered, delayed, or prevented from making improvements or from reclaiming the land embraced in any such entry by reason of such land withdrawal or ir-

rigation project, the time during which the desert-land entryman has been or may be so hindered, delayed, or prevented from complying with the desert-land law shall not be computed in determining the time within which such entryman has been or may be required to make improvements or reclaim the land embraced within any such desert-land entry: Provided, That if after investigation the irrigation project has been or may be abandoned by the Government, time for compliance with the desert-land law by any such entryman shall begin to run from the date of notice of such abandonment of the project and the restoration to the public domain of the lands withdrawn in connection therewith, and credit shall be allowed for all expenditures and improvements heretofore made on any such desert-land entry of which proof has been filed; but if the reclamation project is carried to completion so as to make available a water supply for the land embraced in any such desert-land entry, the entryman shall thereupon comply with all the provisions of the aforesaid Act of June 17, 1902, and shall relinquish all land embraced within his desert-land entry in excess of 160 acres, and as to such 160 acres retained, he shall be entitled to make final proof and obtain patent upon compliance with the terms of payment prescribed in said Act of June 17, 1902, and not otherwise. But nothing herein contained shall be held to require a desert-land entryman who owns a water right and reclaims the land embraced in his entry to accept the conditions of said Reclamation Act.

On June 9, 1906, the President approved "An Act to provide for the disposition, under the public land laws, of lands within the abandoned Fort Shaw Military Reservation, Mont." The act is brief and its terms can be readily understood from the following text:

An Act to provide for the disposition under the public land laws of the lands in abandoned Fort Shaw Military Reservation, Mont.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Secretary of the Interior is hereby authorized to dispose of the lands in the abandoned Fort Shaw Military Reservation, in Montana, under the provisions of the public land laws, and the public land surveys shall be extended over the lands therein: Provided, That he may reserve for Indian school purposes the following-described lands in township twenty north, range two west, Montana principal meridian, as determined by the extension of the public surveys: That portion of section two lying south of Sun River, all of sections eleven, fourteen, and twenty-three, and that portion of section twenty-six lying within the present reservation boundary: Provided further, That before opening the reservation to entry, the Secretary of the Interior may withdraw any other lands therein needed in connection with an irrigation project under the provisions of the Act of June 17, 1902, known as the Reclamation Act, for use or disposition thereunder.

The lands in the Fort Shaw Military Reservation will form an important part of the Sun River project in Montana, and the fact that this area of 29,843 acres, which contains 17,500 acres of irrigable land, was not open to disposition under the Reclamation Act excluded from the Sun River project some of the best lands which could have been irrigated under the system.

This large area was unused except for the Indian school, which was established there some years ago. The school could properly use but a very small portion of the land and this act consequently sets apart about 2,200 acres, which includes the lands already improved by the school and is supposed to be ample for all its purposes.

The passage of this act will simplify the development of the Sun River project and add to it a considerable area of valuable land.

PROGRESS OF SHOSHONE PROJECT

BY

H. N. SAVAGE

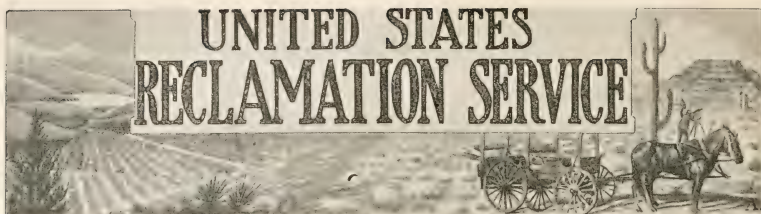
WORK on the two principal structures in connection with this project has now assumed an interesting stage. The temporary works for the great Shoshone dam, which is to be the highest in the world, have been completed so far as possible and are now handling the annual flood. A tunnel, 500 feet long, has been driven through the rock ledge along the dam site, and a temporary dam has been completed across the stream, 1,000 feet above the tunnel. A flume takes the water from this temporary dam and conducts it to the tunnel. The contractors are also damming the permanent spillway tunnel. This is located 240 feet above the bed of the stream and has a cross section of 20 feet square, and will have a discharge capacity of 20,000 cubic feet of water per second, ample provision being thus made for handling the greatest flood the river can produce.

The big plant for crushing the rock and sand, (all sand for the masonry work being crushed from the granite,) and for mixing the concrete and also for excavating and handling the material from the dam site, is being erected. Two Lidgerwood cables, each having a span of over 1,000 feet, are being assembled and will be erected as soon as the flood will permit. Cement is being hauled from Cody station, 8 miles away, and stored at the dam site, every provision being made to commence excavating and construction work on the main structure at the earliest possible date when the flood shall have subsided sufficiently to permit.

The water impounded behind the Shoshone dam will be first conducted 10 miles down the main channel of the

river, and then diverted by means of a tunnel $3\frac{1}{2}$ miles long out upon the land to be irrigated. This tunnel is ten feet square in cross sections and will have a capacity of 2,000 acre-feet of water every 24 hours. Construction work is being rapidly pushed. About 400 men are now at work, the nature of the material encountered being exceptionally favorable for rapid excavating. The soft sandstone can easily be drilled by the use of coal-boring augurs. These are driven by compressed air. Frequently a hole six feet in depth is driven in six minutes. The tunnel was located with special reference to rapid construction. Ten headings have been opened up and work is being conducted in three continuous shifts. Two concrete mixing plants have been erected and the tunnel is being lined as rapidly as it is driven. While active construction work was not begun until December, 1905, the contractor expects to complete the three miles and a half of tunnel by February 1, 1907, and present progress indicates his ability to do so.

Bids for the Garland canal, which is an extension of the Corbett tunnel, were opened several weeks ago, and advertisement will be made at once for the structures along this canal. The engineers are now making final location for the lateral distribution system to cover the first 30,000 acres, the line being situated in the vicinity of Garland. In locating the main canal an opportunity for providing domestic water supply for the towns likely to spring up along the line of railroad has been found. Provisions will be made whereby an abundant supply of domestic water can be had at a nominal expense whenever the requirements exist.



Progress of Government Irrigation Work During Past Month

Umatilla Project Authorized

The Secretary of the Interior has authorized the Reclamation Service to proceed at once with the work of construction on the Umatilla irrigation project, Oregon, for which the sum of \$1,000,000 was set aside from the reclamation fund by the department on December 4, 1905.

The Umatilla project embraces 20,000 acres immediately south of Columbia River, and east of Umatilla River. The engineering work in connection with this project consists of a feed canal from Umatilla River to the Cold Springs reservoir, and a distribution system. The works are of simple character and capable of being constructed in a short time. The irrigable area under this project lies below 500 feet in altitude, is rolling in character, and the lands are of high fertility. The climate is warm and the soil adapted to orchards, small fruit and vegetables. Transportation facilities are excellent, the lands being within 200 miles of Portland, Ore., or Spokane, Wash., on the main lines of the Oregon Railroad and Navigation Company.

For Private Enterprise

After a careful investigation of conditions connected with the Lake DeSmet project, Wyoming, it has developed that the conditions are more favorable for irrigation by private enterprise than by the Government. The Secretary of the Interior, therefore, has restored to settlement a tract of land which was temporarily with-

drawn in connection with this project, such land not to be subject to entry, filing, or selection, however, under the public land laws until ninety days after notice by such publication as may be prescribed by the department. The tract thus restored consists of the public lands within an area of about 400,000 acres.

Losing Engineers

The inauguration of many large engineering works at this time, such as the National reclamation projects, the Panama canal, and the New York barge canal, and the unusual amount of railroad building has so stimulated the demand for engineers that it is found difficult to hold good men at the salaries the Reclamation Service is now paying.

About forty engineers of various grades have resigned from this bureau in the past year, and a similar number have requested furloughs, nearly all of these being on account of railroad or other organizations. The emoluments of a Government position are seldom commensurate with the value of the services rendered by the engineering profession, and but for the magnitude of the works projected by the Government and the opportunities offered to obtain distinction in their construction, few engineers of ability would seek these positions.

The regulations do not permit the engineers to accept outside work, even in an advisory capacity, a privilege which is not denied other members of the profession, and from which they

are able to add materially to their salaries. In the matter of subsistence and other expenses the Government is not as liberal as other employers, and it is not to be wondered at that Uncle Sam is losing a large number of skilled and experienced men whose services are greatly needed. The gravity of the situation is appreciated, and is giving the department much concern.

Decision on Residence

The Secretary of the Interior has received a request for an opinion as to whether a citizen of the United States, whose duties compel him to reside temporarily in Washington during the session of Congress, is entitled to purchase lands within the limits of a reclamation project from present owners and obtain the benefits of the Reclamation Act, providing he complies so far as his duties will permit with the rules and regulations as prescribed.

The Assistant Attorney General states that the question of residence is usually a mixed question of law and fact, and it would be impracticable to attempt to formulate a general rule to govern all cases; each must be determined upon the peculiar facts. Temporary absences do not necessarily terminate a residence once established. If the citizen shall establish in good faith a residence upon the land or in the neighborhood of the tract, and shall maintain such residence in accordance with the true intent of the law, his temporary absence would not disqualify him from receiving and holding a water right. His right would have to be determined by the facts as they develop in the future.

Co-operative Work

The Reclamation service is coöperating heartily with the Bureau of Plant Industry in a series of experiments which the latter is initiating in the vicinity of Yuma, Ariz. A plot of ground controlled by the service has been turned over to the plant experts who propose to experiment with cotton and other crops.

The delta of the Colorado River has always possessed a singular fascination for the scientific men of the Department of Agriculture, and the results of these experiments cannot fail to prove of inestimable value to the settlers, who will take up homes in this region as soon as the Government's irrigation works are completed.

It is a demonstrable fact that no other portion of the United States, when irrigated, is capable of supporting a denser population than the Colorado delta. Five acres properly cultivated and irrigated will support a family in comfort as the crop season is practically continuous. One crop follows another throughout the year. Oranges, pomelos, melons, all the small fruits and vegetables mature earlier here than in California, and consequently are marketable at the top prices.

In connection with the coöperative work between the United States Reclamation Service and the Department of Agriculture, Prof. F. C. Miller, of the Forest Service, will at once begin a study of the tree planting possibilities in the North Flatte irrigation project.

In coöperation with the work of the Reclamation Service on the Truckee-Carson irrigation project, Nevada, the Bureau of Forestry will begin at once a thorough study of the tree planting possibilities in that project. The work will be directed by Mr. E. O. Bierke.

Southern Stream Gaging

Mississippi and eastern Louisiana are about to receive the attention of the Geological Survey. In response to numerous requests from many parts of this drainage area the Hydrographic Branch will establish at once a number of river stations for the purpose of collecting data in connection with the development of water power and the irrigation of truck farms.

Mr. W. E. Hall, a representative of the Hydrographic Branch, has recently made reconnaissances to locate suitable points for obtaining reliable data concerning the flow of several streams

having taken a full course in civil engineering. His experience consists of surveying, mapping, and computing, designing and constructing head-gates, flumes, and lateral intakes, location of main canals and laterals, topographic surveying, and performing the duties of assistant engineer or constructor.

Mr. R. M. Packard, of Lincoln, N. Y., has been directed to report to Reginald E. S. Macdon, Master, State, for duty in connection with the Flansley irrigation project. Mr. Packard, who is a student at Cornell Uni-

versity, has had experience in hydrographic work for the United States Geological Survey.

Mr. John C. Holmes, of Omaha, Neb., has received an appointment as assistant engineer in the United States Reclamation Service and assigned to duty on the Flansley project, Montana. Mr. Holmes took the degree of C. E. at the University of Nebraska, and has had experience in various capacities in surveying and designing the canal systems. He is now engaged as structural engineer by the Des Moines Bridge and Iron Works, Des Moines, Iowa.

PUMPING WATER

Third Paper

The arrangement of windmills for pumping water for irrigation is illustrated in the following accompanying sketch given a view of an wind-mill installation for water supply in form. The two windmills, which supply the water, are placed upon opposite sides in order that the pump may be as far from the windmill as possible. In many instances there is not time with such a number of windmills used. The better mode of work are carried out with a system that does nothing or is disturbed by the water being more or less white.

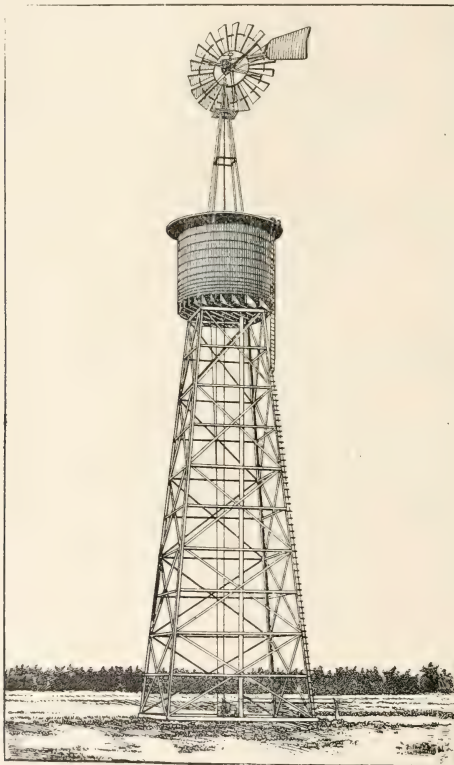
The drawing of the windmill and pump showing a side elevation is a sketch of a windmill for use in a smaller water supply in the Flansley water in a village or small town under considerable pressure. The wind-mill is mounted on the top of a high steel tower, which also supports a wooden tank with suitable cover to protect the water from loss by evaporation. This tank is generally enclosed by a raised concrete or stone wall on the great pump, where the wind may be directed upon the tank

a sufficient supply into the tank for use by the pump or for the railroad shops and other. Many towns have found for their water supply for domestic needs and for watering gardens upon a windmill pumping water and an elevated tank, particularly when the general surface is so nearly level that it is impossible to construct a steel pipe, concrete, or other material because of the price of the material.

The concrete mill, or pump, windmills, has been proposed to a considerable extent in the Great Plains region, and is usually constructed by the owners. The most of the design is in the pump. It may be built mainly of old lumber and other material that can often be found about the farm, and as well as other gear from old farm machinery. This may be saving the mill and pump of wood or metal which may be claimed as old parts. The machine cannot be accommodated on the ground of efficiency or economy. If a farmer has sufficient capital to purchase and erect a good windmill, he will undoubtedly succeed better than by spending his time in making the cheaper design. On the

other hand, in situations where, as is often the case in a dry region, the farmer has lost crops year after year, has exhausted his resources, and is on the verge of bankruptcy, a contrivance of this kind may serve to save a small crop and give him a new start. In such instances there usually will be

The mill or engine consists of a shaft of wood or iron placed horizontally and supported at each end. Upon this sails are fastened by arms extending out at right angles. On each end of the shaft is attached a crank, and each of these cranks in turn drives some simple form of home-made

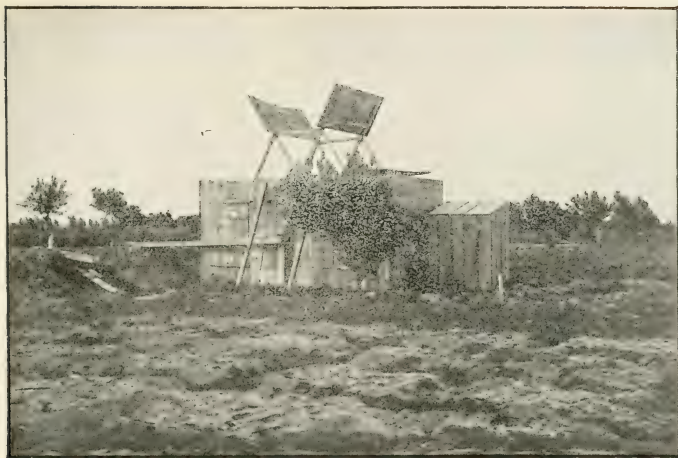


Steel Windmill and Tower Carrying Tank.

found pieces of broken-down machinery about the farm. Time and labor are commonly of little value where the ordinary farming operations have been unsuccessful, so that by the exercise of a little ingenuity the material and energy that otherwise would be wasted may be turned to advantage.

pump. The lower half of the mill is boxed in, and thus forms a small building without roof, above which project the arms carrying the sails.

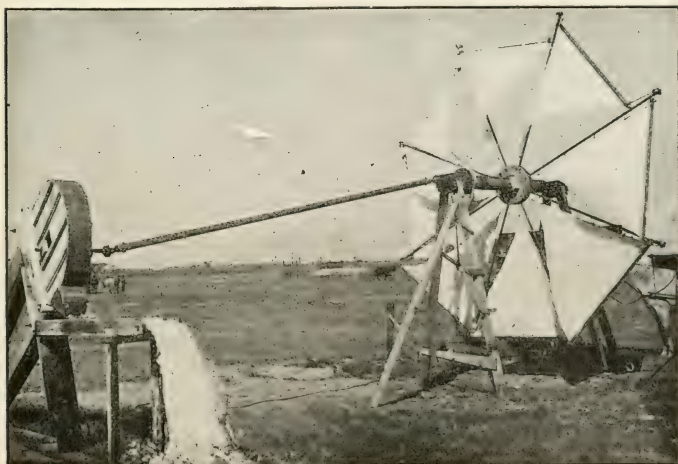
Another home-made device has been introduced. This mill and water elevator, invented by the owner, has been successfully used to furnish wa-



Home-made Wind Engine as Used on Great plains.

ter for irrigation; and, although not by any means an economical device, nor one that can be recommended, it has served its purpose. In other words, while, as a rule, it is economical to purchase the best, there are cir-

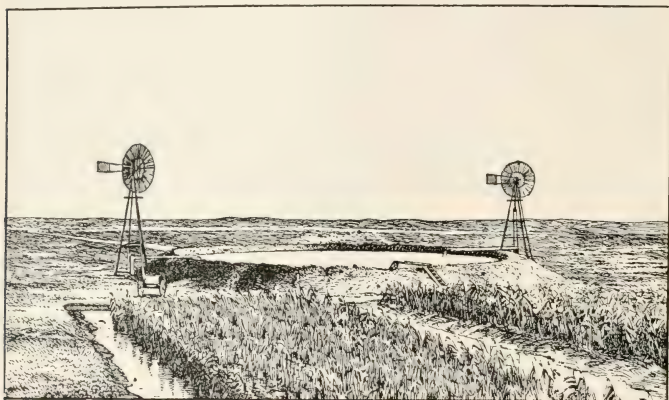
cumstances and times when for special reasons the best mill cannot be had; but it is still practicable to construct a machine which will accomplish the desired end, that of getting water from the ground upon the land.



Defender Windmill and Water Elevator.

These examples of inventive genius on the farms of the West might be almost indefinitely multiplied, but are sufficient to demonstrate the principle that with energy and ingenuity a start toward irrigation can be made. When, however, some experience has been had in irrigation and newer mills are being produced, it is highly essential for continued success that something

gator. Thousands of windmills are in use and thousands more will be purchased, involving expenditures on the part of farmers aggregating millions of dollars. A saving of even a small percentage in cost of repairs is a matter of considerable importance to the irrigators of the country in the continued use of the water.



Windmills and Circular Reservoir.

better than the ordinary form of mill be obtained. Many of these have been designed for some other purpose than that of raising large quantities of water through a short distance for irrigation. Some, for example, have been built with the idea of pumping a small quantity from great depth for watering stock. Such mills, as a rule, do not fill the requirements of the irri-

If a farmer is able to buy a windmill and pump he should get the best, as the first cost is about the same for different makes; but the economy of repairs is far different. In subsequent articles the attempt will be made to give the experience of practical irrigators in using various styles of machinery, pointing out the benefits of each other under certain conditions.





History of Past Month in Government Forest Work

Planting on Watersheds

A variety of causes are awakening an interest in forest planting on lands owned primarily for some other purpose than the use of timber but capable of yielding an added revenue from crops of trees. Coal and railroad companies and other large landowners, including water companies, are taking active steps to utilize waste lands in this way. The fact that local supplies of railroad ties, mine timbers, and lumber are shrinking, coupled with the realization that the needed timber can well be produced on soil now unproductive, has made forcible appeals to the business mind. In Pennsylvania, especially, large forest plantations are actually under way.

There are enormous areas in Pennsylvania from which the original timber has been cut, and which are too rough for profitable farming. In the coal regions both the farm lands and the mountainous areas overlying the coal veins are usually held by the operating companies in order that they may obtain full rights to the coal underneath. Much of the land overlying the coal is useless for farming at any time, and it has been found that there is little profit to be derived from the agricultural land by any system of tenant or company farming. Both these classes of land may be planted to trees with advantage and the timber used in the mines, the old fields on which farming has been attempted being particularly desirable for planting. In the bituminous coal fields it is necessary to select the planting sites with great

care so as to avoid the sulphur fumes from coke ovens, which are very destructive to vegetation. Watersheds owned to prevent further denudation and the contamination of streams and reservoirs rarely yield direct returns to water companies, but if properly planted their water-conserving power would be increased, and at the same time future revenue would be in prospect. Waste lands in general throughout the State can be improved and made productive wholly or in part by forest planting.

The possibilities of forest planting have been realized by several large companies, which have applied to the Forest Service for assistance. The Service has made planting plans for the H. C. Frick Coke Company and the Keystone Coal and Iron Company, in western Pennsylvania, and is supervising planting and the establishment of forest nurseries this spring. The Pennsylvania Railroad Company has secured the assistance of the Service in working up a forest policy, and, in order to show what can be done on the lands they already own, a nursery is being started and planting begun along the right of way and also on an important watershed near Altoona, Pa. The Johnstown Water Company is receiving similar assistance. In eastern Pennsylvania the Lehigh Coal and Navigation Company has applied for an examination of a 36,000-acre tract of the Monroe Water Supply Company, in Monroe County, and the preliminary examination is under way.

Planting is feasible on most of these lands, the greatest difficulty being to keep out fire. Chestnut, red oak, hickory, basswood, white, red, and Scotch pine, and European larch are suitable species, the selection depending on the character of the land and the kind of timber desired.

By the plan of Government cooperation a technical forester can be sent without charge to make a preliminary examination of lands on which planting is contemplated. This determines whether planting is advisable. If the preliminary report is favorable, a detailed plan for planting and nursey work can be made at a cost to the owner of the actual expenses of the work. Supervision can also be provided under special arrangement.

Fire Fighting on Forest Reserves

The worst enemy of the forests is fire. To combat it the Forest Service maintains a fire-fighting system. How effective is this system is shown by the following figures for the last two years:

Year ending—	Area in Acres.		Per cent of re- serve area burned
	Of re- serves.	Burned over.	
January 1, 1905.....	58,052,054	388,872	0.66
January 1, 1906.....	92,741,030	152,557	0.16

Area of forest reserves in the United States, exclusive of Alaska and Porto Rico.

In other words, while the reserve area has almost doubled, the burned area has been reduced by more than one-half, and the percentage of area burned has been reduced by more than three-fourths.

Only since February 1, 1905, have the reserves been under the administration of the Forest Service. This reduction is therefore the showing of the first eleven months of administration by Government foresters. The working out of a system of effective control of fire on the reserves is still in its infancy. "Too much fire" is still the judgment of the Forester on the situation. Of course, bad seasons play

a large part in determining the fire losses of a year. Even with the best possible system of protection there are bound to be wide fluctuations between individual years. But it is believed that under expert care the injury to the National forests can be rapidly and permanently cut down.

In developing its system of protection the Forest Service availed itself of past experience, home and foreign. The reserve officers—forest guards, assistant forest rangers, deputy forest rangers, forest rangers, deputy forest supervisors, and forest supervisors—are under the direct supervision of the office of the Service at Washington, guided by a definite code of instructions; but large authority, with corresponding responsibility, is placed upon the local officers themselves. All except the forest guards are civil-service employees, and the salaries paid range from \$720 to \$2,500 a year. Each supervisor is responsible for the patrol of his reserve and is expected to devise systems best suited to his locality. Already, in the brief period since the organization of this system, a high standard of efficiency has been developed, and a much higher is expected.

A constant lookout for fires is kept from ridge trails and commanding points during the danger season, and the reserves are patrolled as efficiently as possible with the force available. Roads, trails, and fire lines are constructed, affording means of rapid communication and points of vantage at which to arrest the progress of a fire, and telephone lines are being run to help give warning and summon assistance.

Every forest supervisor is authorized, in person or through a subordinate, to hire temporary men, purchase material and supplies, and pay for their transportation from place to place to extinguish a fire. When the cost is likely to exceed \$300 the supervisor telegraphs the Forester for authority to incur the additional expense.

Forest rangers are required to report monthly to the supervisor regarding all fires occurring in their districts.

These reports cover the location, damage done, probable cause, by whom the fire was discovered, when discovered, when brought to the notice of the forest officer, when the work of fighting the fire was begun and finished, how many extra men were employed, and cost of fire. At the end of the year the supervisor submits an annual fire report to the Washington office.

During the calendar year of 1905, 36 of the 93 reserves escaped fires altogether. On the remaining 57, areas were burned over ranging from 1 to 79,083 acres (Northern Division of the Sierra Reserve) and amounting to 279,592 acres. The largest amount of timber was destroyed on the Lewis and Clark Reserve (Southern Division)—42,893,000 board feet. The total for all reserves was 152,557,000 board feet, with a value of \$101,282, but the greatest loss in money value was \$27,320 on the Priest River Reserve. The total cost of extra labor and supplies for fire fighting was \$12,573.52.

General cooperation of all coming in contact with the forests is earnestly to be sought, first, to guard sedulously against the starting of fires, and, second, to aid in every way in extinguishing such as occur.

In this connection may be mentioned several steps already taken toward co-operation among the Forest Service, the State governments, and local interests in fighting fires.

In California, the Forest Service, the State forester, and the lumber companies are cooperating to prevent and fight fires, all forest rangers having been made State fire wardens. In Oregon and Washington the Forest Service is cooperating with the timber companies to the same end. The Governor of Idaho is inaugurating a movement to organize the timber companies of that State to cooperate with each other and with the State in fighting fires, and has asked the assistance of the Forester, who has replied that the Service will aid the movement by furnishing plans and assisting in carrying out any measures agreed upon by the Idaho organization.

Cross Ties in 1905

Probably no product of the forest has been the subject of more discussion and diversity of opinion than the annual consumption of cross-ties in the United States.

The following statements are made possible by the almost unanimous co-operation of the steam railroads with the Forest Service in furnishing the necessary data. While these statements are nearly complete for the purchases of cross-ties by steam transportation companies, they are below the total number of cross-ties used, since no reports from electric lines are included. The figures given are based upon reports from 750 companies, having an aggregate trackage of 278,262 miles. Since, according to Poor's Manual for 1905, the total trackage of the railroads in the United States is 293,937 miles, it follows that the mileage reported is 95 per cent. of the total. Switch ties have been figured into the equivalent number of cross-ties.

The total number of ties reported is 80,051,000, of which 22,569,000, or 36 per cent., were to be used for the construction of new track.

On this basis the total number of ties used by the steam railways would be 84,400,000, representing nearly 3,000,000,000 feet of lumber, board measure.

Preservative treatment was given to 7,615,000 ties, representing nearly 10 per cent. of the total number reported. Although the species of timber treated have not been separated in most cases, it is safe to say that almost all of the ties treated were softwoods.

Control of Grazing on Public Lands

Now that the Government grazing policy is in successful operation on the National forest reserves, the question has arisen whether the same or some similar policy might not be applied to the open public range.

The policy of the Forest Service is not to hold the reserves out of use, but to secure their fullest and most permanent use. To this end, grazing under proper restrictions is permitted.

Happily, these restrictions have thus far met with general approval.

From the first, the importance of fitting the regulations to local conditions has been recognized. Rules occasioning needless hardship to stockmen have been modified, and emergencies demanding instant action have been promptly met.

When a new reserve has been proclaimed all stock grazing upon it is allowed to remain during the first year; if, afterwards, this number is found to be too great for the resources of the range, it is gradually reduced. Stockmen are aided in effecting a satisfactory distribution of their stock upon the range and in securing from it the most profitable and permanent use. Small stock owners living in the vicinity of the reserves are given such preference in the allotment of grazing privileges as will protect their interests. First occupants of the range and farmers owning improved lands adjacent are also preferred. The rights of large owners based upon the range custom of the past are recognized, and reductions in the number of their stock are required only when necessary to protect the range or the grazing rights of bona fide settlers.

Necessary range divisions between owners of different kinds of stock are made, and controversy between sheepmen and cattlemen is promptly ended. Where necessary, the construction of drift or division fences is also allowed, provided the area fenced is not greater than the needs of the stock owner.

Outside the forest reserves, however, is an area of public land, estimated at 400,000,000 acres, which has no present value except for grazing purposes. On this land grazing is wholly unrestrained by law. Commercial interests, great and small, have competed for its use, and the result has been abuse of the range. Millions of acres have been recklessly overgrazed and practically ruined. In his last annual message the President says: "It is probable that the present grazing value of the open public range is scarcely more than half what it once was or what it might easily be again under careful regulation." Some stock-

men have, to the exclusion of others, possessed themselves of the strategic positions—that is, the lands controlling the streams, springs, and other watering places, and by this means have secured temporary control of the adjoining grazing lands. Charges of fraudulent entry have led to litigation. Great areas have been illegally fenced. Again, stock owners, notably sheep and cattlemen, have defended their conflicting claims by force of arms, causing serious loss of property and even of life.

Obviously such conditions should be corrected by law. The remedy would seem to be to apply to the open public range the regulations already governing the forest reserves. This conclusion is strengthened not only by the success attending the forest-reserves policy, but also by the effect of fencing the public grazing lands. Though illegal, this fencing has in most cases greatly improved the condition of the area inclosed. Care, however, must be taken to avoid the application of sweeping and ironclad regulations to an area so vast and to conditions so different. The investigations of the Public Lands Commission show that immediate application of any inflexible rule to all grazing lands alike, regardless of local conditions or grazing values, would be disastrous, and that improvement must be sought through the gradual introduction into each locality of such form of control as is specifically suited to it.

In his message, already referred to, the President says:

"The best use of the public grazing lands requires the careful examination and classification of these lands in order to give each settler land enough to support his family and no more. While this work is being done, and until the lands are settled, the Government should take control of the open range, under reasonable regulations suited to local needs, following the general policy already in successful operation on the forest reserves."

Should the policy thus suggested be established by law great good would undoubtedly result.

STATE FORESTER FOR MARYLAND

THE appointment of Mr. Fred W. Besley as State forester of Maryland is a good one, and is a deserved recognition of a young man whose love for the profession induced him five years ago to give up a position in which he was receiving a good salary in order to secure a thorough training in forestry.

Mr. Besley was born in Virginia, and graduated from the Maryland Agricultural College, with which in his new position he will be closely identified, the law providing for a course of lectures there each year by the State forester. The first two winters in the Forest Service he spent in the office, where he became thoroughly acquainted with methods of calculating forest measurements. In the summer of 1901 he was a member of a party which made a forest survey of Townships 5, 6, and 41, in the Adirondacks. The following summer he assisted in commercial-tree studies in Kentucky, and for a short time in the fall was engaged with others on a working plan for forest lands of the Kirby Lumber Company, in eastern Texas. Later in the fall he entered the Yale Forest School, from which he graduated in June, 1904. In September of that year he temporarily relieved Mr. Charles A. Scott, who wished to complete his course at Yale, taking charge for nine months of the forest nursery and tree planting on the Dismal River Forest Reserve, at Halsey, Neb. His work was so satisfactory that he was immediately put in charge of planting operations on the Pikes Peak Reserve, establishing nurseries at Clyde and Bear Creek, and planting a considerable area with trees shipped from Halsey. Later, his studies were enlarged to include lecture work in Colorado. In accepting his new duties on July 1, he will still retain a connection with the Forest Service as collaborator, continuing the

coöperative forest work of the Government with the State of Maryland.

This office, created by the new Maryland forest law, brings rare opportunities and also heavy responsibilities. The variety in soil, climatic conditions, and topography, and the peculiar situation of the State where the northern forest and southern forest meet, furnish an unusually large number of tree species, and the problems of handling lands now forested and planting those which should be, present problems which will require the most careful application and special adaptation of the principles of forestry. For this the soundest knowledge of the subject is essential, and here Mr. Besley's wide experience with trees from the seed to the saw will stand him in excellent stead. His ability to interest the public in forest matters is also an important qualification, since the success of the new law depends largely upon the extent to which the services of the forester are utilized by the lumbermen, timberland owners, and especially the farmers, in the management of their woodlots.

Although the State of Maryland has soil and climate admirably adapted for forest growth, in many situations being better suited for them than for annual crops, forest lands are not now paying their owners as well as they should. Indeed, considerable areas, capable of producing the best timber, are occupied by an inferior forest growth, or, having lost much of their fertility in growing tobacco and other soil-exhausting crops, are now scarcely utilized at all. In buying Maryland forest land at present prices and handling it under the expert advice which is now available, the far-sighted man will make a profitable investment. Length of growing season, suitable moisture conditions, nearby markets and excellent transportation facilities would all contribute to the success of

forestry in Maryland. The Secretary of Agriculture spoke first of all of the possibilities in the production of timber in his address at the golden anniversary of the Maryland Agricultural College, when he advised every young man to immediately buy a Maryland farm and settle on it.

The forming of a State forest reserve has begun auspiciously in the acceptance of a gift from Mr. Robert Garrett of 4,000 acres in Garrett County.

Without detracting from the credit due State Senator Brown for the introduction and passage of this excellent law and the concern he is taking in its successful operation, it is interesting to note that in Maryland as in Wisconsin, Massachusetts, Connecticut, California, the enactment of a State forest law and the appointment of a trained forester follow the coöperative work of the Government. In coöperation with the State Geological Survey, the Forest Service has been conducting investigations in Maryland since 1900. In that year, Mr. George B. Sudworth made a forest survey of Allegany County, which was published in a State report upon that county. Under Mr. Sudworth's direction similar surveys were made of Cecil, Garrett, and Calvert counties from 1901 to 1903, by Mr. H. M. Curran, the first two of which have also been published by the State. Similarly, in 1903, a study of forest conditions in Worcester County was made by the late William F. Hubbard, and, during recent months, field work has

been conducted by Mr. C. D. Mell for a forest description of St. Mary and Harford counties.

In addition to the coöperative work, a study of the basket willow industry was made by Mr. Hubbard in Howard and Baltimore counties, and a commercial-tree study of chestnut in Anne Arundel, Calvert, Charles, and Prince George counties by Mr. Raphael Zon, the results of which were published in Bulletins 46 and 53, respectively, of the Forest Service. In connection with Mr. Hubbard's general forest description of Worcester County, he conducted a commercial investigation of loblolly pine—an exceedingly important timber tree in that county for short rotations for box lumber.

In 1905, Mr. Curran made another field study of forest lands in Garrett County, including the tract which has become the nucleus of the State reserve, preparing maps and suggestions for their management.

During the summer of 1905, Mr. William D. Sterrett with a party made a study of scrub pine in Maryland, and Mr. George H. Myers established a number of permanent sample plots for the purpose of carrying on systematic experiments as to the effect of thinnings upon forest growth, for loblolly pine in Worcester County, and for scrub pine at Bowie. Mr. W. W. Ashe made a study of the Potomac River watershed also during the last field season to determine the character of the forest and its relation to the water supply.



WEST VIRGINIA FAVORS RESERVES

The Governor of That Commonwealth
Argues Strongly for Prompt Action

WEST VIRGINIA'S interest in the eastern forest reserve question is shown in the following letter:

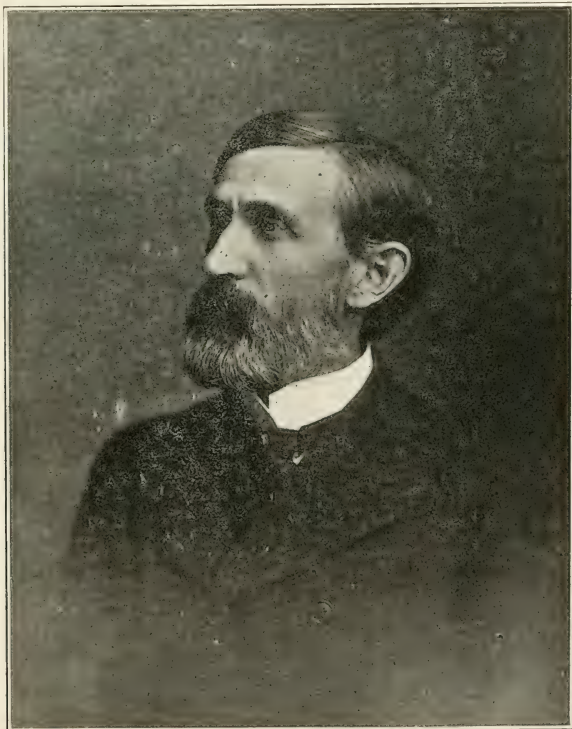
June 5, 1906.

HON. JAMES WILSON,
President of the American Forestry
Association,
Washington, D. C.

Dear Sir: I am in favor of the proposed establishment of the Appalach-

ian Forest Reserve and the White Mountain Forest Reserve:

(a) The teachings of history gleaned from all civilized nations demand that forests should be preserved, that the balance of nature be not disturbed, thus fatally affecting sound economic conditions. Even Russia, since 1888, has had an Imperial Forest Policy. Japan has a reserve of twenty-nine million acres under a finely organized



HON. WILLIAM M. O. DAWSON

The able and aggressive Governor of West Virginia who favors the establishment of Forest Reserves in the Southern Appalachians and the White Mountains.

system. The Appalachian system is now the best hard-wood producing region in the Union, possibly in the world. It can furnish cottages and palaces for the nations. The active spread of railroads is carrying destruction into the heart of these forests, and all the growth, from sapling to trees of mature age, without respect to "color, age or previous condition" are cut. At the present rate of destruction, without means of reproduction, the price of timber for commerce will soon be prohibitive.

(b) In all mountain countries a destruction of the forest has been a destruction of the country. "After the timber the flood." The soil hardens like a slate roof and the water runs off. It is the amount of water which enters the soil, not the precipitation, which makes a region a garden or a desert. The soil is destroyed, the streams dwindle to nothing or at times are irresistible torrents, spreading devastation and terror along their

courses. The land under consideration is said to be valuable as forest lands only. It lies at the sources of interstate rivers and its preservation as a forest region is of untold and inestimable value to the countries below.

(c) In a denuded country the streams are yellow, the soil carried to the sea, navigation impeded thereby, water power imperilled, food fish and other aquatic life killed, and scenic beauty destroyed.

The above applies not only to this State, but with equal force to the other States concerned. Nearly every Governor's message of recent years has directed attention to this important matter; and our recent Tax Commission, an able body, went beyond its legitimate scope to urge attention to it.

Respectfully,

WM. M. O. DAWSON,
Governor of West Virginia.

SPRING FIELD WORK OF THE SENIOR CLASS OF THE YALE FOREST SCHOOL

BY

HERMAN H. CHAPMAN

THE senior class of the Yale Forest School, seventeen in number, spent the spring term at Waterville, N. H., upon the tract of 22,000 acres owned by the International Paper Co. This valley contains one of the largest bodies of virgin spruce remaining in New Hampshire. The slopes of the surrounding mountains are still covered with dense stands of timber, although most of the lower slopes have been logged.

The conditions are ideal for training in the practice of map making, and timber cruising and along these lines the work was organized. The School was fortunate in securing Mr.

Henry Gannett, Chief Topographer of the U. S. Geological Survey, to direct the construction of a topographical map of the Waterville valley. A scale of 2,000 feet to 1 inch was used, with contour lines at 100 feet intervals. Primary points were located from a base line with the plane table, and transverse run along roads, streams and trails, using steel tapes and aneroids. From the data thus obtained the contours were sketched in. Each man completed this portion of the work independently.

Practice in estimating was taken up systematically upon a tract of 40 acres on which all the spruce were first cal-

ipered and their contents calculated from an existing volume table. One tract was then estimated by taking circular quarter acre plots at regular intervals so as to obtain 1-10 of the area. The results so obtained, using the same volume table showed a conservative estimate, running with some crews 20 per cent. lower than the actual stand.

The second method was the selection of a sample acre, the contents of which was multiplied by 40 to get the total stand. This method universally overran the actual stand, in some cases going 40 per cent. too high.

The class then took up the estimation of the log contents of trees. Strips were run 4 rods wide in compass courses. The diameters were estimated by the eye and recorded by dots and in parallel columns, the upper diameter of each log, and total number of logs in each tree. The contents of the logs were calculated by the Scribner rule to obtain the stand per acre. By this method, and having a tract whose total stand was known, as a basis, the men rapidly acquired the ability to accurately estimate timber and became familiar with log sizes, number of logs per tree, number per thousand feet scaled and the taper of

the timber. The slender rapidly tapering timber of upper slopes was estimated by this method as easily as the taller timber below, and the only checks found necessary were the occasional measurements of a fallen tree for merchantable length and taper.

The whole tract of 22,000 acres minus the cut-over land was then estimated by this method, the work occupying about 10 days for 17 men. While running the strips, distances were obtained wholly by pacing, the total distance of each line being scaled off the map to serve as a check, especially on steep slopes. The cut-over areas, and types were mapped at the same time, and notes taken on the character of the timber, reproduction and possibilities of logging.

During the final week this data was summed up and a working plan was made for the tract, comprising a plan for fire protection, lumbering and administration with the object to maintain the spruce forests on all areas suitable for its growth and secure as large a return as possible in the future at minimum cost.

The class will go out well equipped for similar work on the Government reserves or for private parties.

THE MANTI FOREST RESERVE

Description of a Typical Reservation in Utah

BY

A. W. JENSEN

Forest Supervisor.

THE Manti Forest Reserve, Utah, was established by proclamation of the president of the United States. Theodore Roosevelt, on the 29th day of May, 1903, and embraces an area of 584,640 acres.

This reserve is located between the 111 and 112 degrees west longitude, and the 39 and 40 degrees of north latitude, and within townships thirteen to twenty-one south, and ranges two to eight east, S. L. Mer., embracing valuable grazing, timber, mining, and

watershed lands of the Wasatch Plateau. Immediately at the foot of the reserve and upon its western side the valuable lands of San Pete County, and upon the eastern side the valuable farming lands of Emery County.

The elevation of the reserve varies from 5,500 to 11,000 feet and from its summit or dividing watershed line which extends through the entire reserve at an angle of south 18 degrees West, arise canyons which traverse the reserve from two to twenty miles and

enter the valleys below. Through these canyons flow the waters which come from the melting snow to the valley where it is used for irrigation.

On the eastern slope immense, precipitous ledges of rock, in many places hundreds of feet high have been exposed and yet left intact by the erosion of centuries, while on the western slope the grade is gradual toward the base of the mountain sides.

Upon the higher elevation of the reserve, especially within 8,000 feet to 11,000 feet, falls, during the winter season, from November until March or April, great quantities of snow which melts during the months of May, June, and July and furnishes life to the mountain springs and streams. The water from this snow is used by the farmers for the irrigation of lands producing wheat, oats, barley, rye, corn, potatoes, beets, and alfalfa. The snow is piled and packed by the winds upon the north slopes of the canyons within the reserve and particularly at the altitude heretofore mentioned.

The approximate acreage of irrigated lands is 55,000, and upon such a small main watershed, have been grazed during the months of July and August, each year for ten years preceding the year 1904, approximately 300,000 sheep.

This grazing was in excess to the producing power of the lands, and for each year for ten years past, and preceding the year 1904, the watershed was being made a desert waste.

The rains falling upon the denuded and over-grazed lands became torrential floods which swept their way into the hamlets and towns situated in the valleys below, and carried with them immense quantities of rock and debris.

Creek beds were changed and cut deep into the mountains, the laterals taking water to the farmers' lands were destroyed, and the work of man in many places swept away.

These floods, each one in its turn increased the taxes of the people, until the town of Manti decided that relief must be found. Manti turned its face toward the Government of the United

States for help, and succeeded in securing it. The Government said the Manti city watershed must be protected from devastation by stock. The policy announced was set in active operation, the vegetation began once again to come forth upon denuded areas, the rains falling upon the protected canyon area was to a marked degree held back in the mountains, the floods began to grow less, and the taxes of Manti City for years levied and collected to combat the floods were reduced, and in the year 1904 it was almost unanimously conceded that the Government had solved the vexatious question and restored a new hope and life to the troubled town.

The people of other towns, both of San Pete and Emery Counties quickly noted the effect. This moved them to turn to the Government for the same class of protection. Therefore, President Roosevelt expressed the majority voice of the people of San Pete and Emery Counties, Utah, when he established the Manti Forest Reserve, and since the date of the establishment of this reserve the people's petitions have been further answered by the proper Department in making rules of protection against overstocking the main watershed.

During the year 1904, the first year of Government management of grazing upon the reserve, it was almost universally conceded that upon seventeen creeks originating within the reserve and carrying the water supply for irrigation of lands in San Pete and Emery Counties, the work of the Department wrought great benefit in maintaining a continued and improved water supply.

Within the eastern part of the reserve are immense coal deposits, and in many of the canyons veins of coal varying in thickness from 6 to 12 feet appear upon the surface. The coal deposits can be traced without fault for a distance of over 35 miles, and at coal mines in several places the neighboring residents of the reserve can be seen, during the fall season, to drive into the mine with teams unhitched,

load the wagons and drive out of the mine.

Much coal have heretofore been removed from the reserve lands, and it is expected that the establishment of the reserve will aid in such a manner as to have these lands only conveyed to private parties pursuant to the Federal law.

It appears from the records made by the Department within the last two years that the Manti Forest Reserve has fed great numbers of stock during the summer seasons for ten years past.

It was an agitated question of range management at the time of the creation of the reserve, for evidence of overgrazing indicated that some move must be made or the range would be made a desert. The establishment of the reserve and its management seems to have settled the question, and it has been the aim of the Forest Service to so conduct the reserve as to give the greatest benefit to the greatest number of people, commensurate with the productive power of the reserve.

The regulation has reduced the number of sheep heretofore grazed by certain parties so as to not exceed one herd to each person.

The timber valuable for lumber purposes as found within the reserve is

situated at an elevation varying from 7,000 to 9,000 feet, and always upon the northern slopes, where it is protected from the fierce and heavy winds. Among the species found are: White Fir (*abies concolor*) local name Black Balsam; Balsam Fir (*abies lasiocarpa*) local name White Balsam; Engelmann Spruce, Douglas Spruce, Blue Spruce and Western Yellow Pine, and Lodgepole Pine.

During the past and before the establishment of the reserve much timber has been destroyed by fire and wasteful cutting, especially was this true during the years of 1890 and 1891 when the forests were cut without reservation and in an extremely wasteful manner for the purpose of making railway ties.

Several places within the reserve virgin pine forests are to be found, and in many places dense undergrowth of shrubs.

The timber operations have taken on a new aspect since the cuttings are done under the immediate supervision of an officer of the Forest Service, and at one cutting point upon the reserve last season where only 200,000 feet were cut, more than 700 cords of dead, down and valueless material was piled and burned.

TIMBER STUMPAGE BUSINESS OF THE NATIONAL GOVERNMENT

Over a Quarter of a Million Dollars' Worth Sold
in 1905—Saving the Woods While Selling
the Trees—Prompt, Businesslike Management.

A NATURAL feeling among lumbermen toward the forest work of the Government is that the Government is not in the lumber business and can not, therefore, take the lumberman's business point of view. Yet a greater misconception could scarcely exist. As a dealer in stumpage the Government is the largest lumber deal-

er in the country. Further, it applies to its sales the practice of scientific forestry, requiring the removal of the timber under the same sort of instructions which it advises for private operators. Thus the Forest Service, in its reserve work, is giving an object lesson on a huge scale to enforce its teachings that conservative manage-

ment and profit may go hand in hand. In the year 1905 the total sales reached a value of \$273,659.82.

By the Act of March 3, 1891, the President of the United States was authorized to proclaim forest reserves; a power first exercised by President Harrison, who, on March 30 of that year, created the Yellowstone Park Timber Land Reserve. Authority over these reserves was given to the Secretary of the Interior, the administrative work to be conducted by the General Land Office.

The mere creation of forest reserves, however, without provision, for their administration was both ineffectual and annoying to local interests dependent upon their resources. Consequently the Secretary of the Interior, in 1896, requested the National Academy of Sciences to recommend a National forest policy. This resulted in the passage of the Act of June 4, 1897, under which, with several subsequent amendments, forest reserves are now administered.

CHANGE OF ADMINISTRATION.

Still, the result was not satisfactory. Scientific knowledge and a technically trained force were necessary. The Bureau of Forestry had frequently to be consulted. Finally, the Act of February 1, 1905, was passed, transferring the entire jurisdiction, except in matters of surveys and passing of title, to the Secretary of Agriculture. The actual work of administration was thereupon given to the Bureau of Forestry, since July 1, 1905, styled the Forest Service.

The policy upon which these reserves were to be administered is indicated by the following extracts from the letter written February 1, 1905, by the Secretary of Agriculture to the Forester:

"In the administration of the forest reserves it must be clearly borne in mind that all land is to be devoted to its most productive use for the permanent good of the whole people, and not for the temporary benefit of individuals or companies. All the resources

of forest reserves are for *use*, and this must be brought about in a thoroughly prompt and businesslike manner, under such restrictions only as will insure the permanence of these resources. * * *

"You will see to it that the water, wood, and forage of the reserves are conserved and wisely used for the benefit of the home builder first of all. * * * In the management of each reserve local questions will be decided upon local grounds; * * * where conflicting interests must be reconciled, the question will always be decided from the standpoint of the greatest good to the greatest number in the long run."

The principal object of the forest reserves is use. The policy governing these great storehouses of natural wealth is not one of locking up and rendering inaccessible their resources, but of conserving and multiplying them and making them available to consumers.

EFFECTIVE ORGANIZATION.

That a Government bureau can actually thus subserve the interests of users is at first a matter of some skepticism with practical lumbermen. Their fear is that such work will be conducted from a remote Government office by men unfamiliar with local needs.

It has remained for the Forest Service practically to demonstrate the groundlessness of these fears. To this end it has rapidly developed an organization. On July 1, 1898, the Division of Forestry employed eleven persons, of whom six filled clerical or other subordinate positions, and five belonged to the scientific staff. Of the latter, two were professional foresters. The Division possessed no field equipment; practically all of its work was office work. At the opening of the present fiscal year the employees of the Forest Service numbered 821; of whom 153 were professional, trained foresters. The field force of the Forest Service contains the grades of Forest Inspector, Forest Supervisor, For-

est Assistant, and Forest Ranger. In so far as possible the administration of the reserves takes place on the ground and with the promptness that is supposed to characterize private business.

One of the most important aspects of forest administration is the sale of timber. All timber on forest reserves which can be cut safely and for which there is actual need is for sale. Applications to purchase are invited. Green timber may be sold except where its removal makes a second crop doubtful, reduces the timber supply below the point of safety, or injures the streams. All dead timber is for sale. The cutting of this timber is done under the local supervision of the Forest Service and in accordance with certain clearly defined and practical rules.

SPECULATION PREVENTED.

The restrictions governing the timber sales, while effective, are simple. Application is made to the local officer in charge of the reserve from which the timber is desired, who executes small sales on the ground. In case of large sales, the application is forwarded to the Forest Service, from which the advertisement of the sale is made. Applicants for timber are required to send sealed bids to the Forest Service. Small bidders enjoy exactly equal opportunities with large, and monopolization is effectually forestalled. The highest bid fixes the price. Should the first applicant desire to begin cutting immediately he may (except in California) do so, on condition that he pay in advance at a price already fixed by the Forest Service, and that he obligate himself to pay the full amount named in the highest bid. Thus delay is avoided and the Government is protected. Speculation in reserve timber is made impossible by the provision that the timber must be removed within a specified time(and that when a contract extends over several years a proportionate amount of timber must be removed each year. Five years is the extreme limit of a sales contract.

That these restrictions are not onerous is shown by the numerous sales made under them. A single sale of 50,000,000 feet of lodgepole pine for railroad ties is pending on the Montana Division of the Yellowstone Forest Reserve. It is estimated that 165,000,000 feet B. M. of lodgepole pine can be taken from one watershed in the Medicine Bow Forest Reserve, still leaving a large percentage for future crops. Much timber is sold in small lots; fifty applications for such sales are made to each single application for 1,000,000 board feet or more; the prompt, businesslike consideration accorded such applications standing in marked contrast with the slow methods once prevailing, when all applications had to be made through Washington.

FORESTS AS REVENUE.

During the year 1905 the sales of timber from the National reserves were as follows:

The largest sales so far made are 71,466,537 board feet from South Dakota; 68,255,916 from Wyoming; and 5,327,443 from Utah.

In sales of wood for fuel South Dakota led with 29,844½ cords; Arizona followed with 16,649; and Colorado with 10,795½. The total number of cords sold was 74,120.

In sales of posts and poles Montana led with 119,500, followed by Wyoming with 30,750, and Colorado with 13,988. The total number sold was 188,740.

The largest timber sales were made in Wyoming, where they reached \$143,894.81. South Dakota's sales ranked second in value, amounting to \$78,958.24, and Colorado's to \$23,937.07. The total sales for 1905 reached \$273,659.82.

Nor are the receipts from these sales swallowed up by the cost of administration. The entire property of the forest reserves, worth \$250,000.00 in cash, is now being administered at a cost of less than one-third of 1 per cent. on its value, while increase in

that value of not less than 10 per cent. a year is taking place. As the use of the reserves increases, the cost of administration must, of course, increase also, but receipts will certainly increase

much more rapidly. The time is not far distant when the forest reserves will become self-sustaining. Later, they may confidently be expected to become a source of public revenue.

BEECH (*Fagus atropunicea*)*

VII.—Notes on Forest Trees Suitable for Planting in the United States.

DISTRIBUTION.

The natural range of the beech is from Nova Scotia to northern Wisconsin; south to western Florida, and west to southeastern Missouri and Texas. It reaches its maximum development on the slopes of the Allegheny Mountains and in the valley of the lower Ohio River. It occurs in mixture with most of the trees included in its range.

The range for economic planting corresponds closely with its natural range.

SOIL.

The beech prefers fresh, cool, and rich soil. In the North it is found upon the slopes of mountains, where it sometimes forms pure stands; in the South it grows along the margins of swamps, or in bottomlands along streams. It grows well on limy or chalky soils.

GROWTH AND REPRODUCTION.

The beech is a moderately rapid-growing tree, sometimes, under favorable conditions, reaching the height of 120 feet. In dense forests it produces a tall, straight, slender trunk, which is adapted for economic purposes. The tree is shade-enduring, and the lower limbs persist for a long time. The open-grown tree forms a short, conical trunk, with many small limbs branching from it. The lower

ones droop towards the ground, and if not pruned the tree forms an elongated dome which is very ornamental for parks or lawns. The light-colored bark and fine spray of delicate branches make it even more beautiful in winter than when in full leaf.

The beech usually forms the understory in the mixed stands where it occurs. It reproduces well in shade from the seed, as well as from root suckers. The several nursery varieties are propagated by grafting.

The beech is adapted for planting under evergreens such as white, red, or pitch pines, or it may be planted in company with the yellow poplar, black walnut, ashes, or oaks. When planted with less tolerant trees, the beech acts beneficially by shading the ground, and at the same time aiding natural pruning and increasing the height growth of associated species. Beech is also adapted for planting on cut-over lands where reforestation is desirable.

If planted in pure stands, 8 feet by 8 feet is a good distance to set the seedlings. This requires 680 seedlings per acre.

If planted in mixtures, the following diagram illustrates a good plan;

[6 feet by 6 feet.]

P	B	P	B
B	B	B	B
P	B	P	B
B	B	B	B

*Furnished by U. S. Forest Service.

P—White, red, or pitch pine, yellow poplar, ashes, or oaks.

B—Beech.

This plan requires 908 beeches and 302 of the other species, or a total of 1,210 trees, to the acre.

Beech trees produce an abundant crop of nuts every two or three years. The three-cornered nuts ripen in the fall and drop soon after the first severe frost. If allowed to dry out, the nuts become rancid and the germs die. To prepare them for planting they should be stratified through the winter. A pit is dug and lined with mouse-proof material, or a large box is placed in it. Alternate layers of moist sand and nuts are then laid in and covered on top with a wire screen or boards. A mulch of leaves or straw mixed with some earth is thrown over the filled pit. Before the nuts are placed in the pit they should be fumigated with carbon bisulphide to kill the worms that may infest them. This may be done by placing them in a box, boring a hole through the cover, and pouring in some liquid carbon bisulphide. The hole should then be immediately plugged and left closed for two or three days. This will completely kill all insects without injuring the seed.

In the spring, as soon as the frost is out of the ground, the nuts should be planted, either directly in the permanent site, in which case three or four should be planted in each hole, or in a seedbed, from which the seedlings should be transplanted when a year old. In a seedbed the nuts, of which about 80 per cent should germinate, should be sown about 2 inches apart in rows. If they have not dried out during the winter, they should sprout in a few days. Care should be taken to keep weeds out by giving frequent cultivation. After a seed year young seedlings appear in large numbers in beech woods and may be dug up and transplanted, or they may be obtained at a reasonable price from nurserymen.

ECONOMIC USES.

Beech wood is hard, heavy, strong, and stiff. It is not durable in contact with the soil. It is fine grained and seasons with very little checking. It is used considerably in the manufacture of carpenters' tools and machinery. On account of its great hardness and stiffness it is admirably adapted for flooring in machine shops where rigidity is demanded, for, although strong, it will break before it bends much. For ordinary flooring it is so hard that it soon becomes very slippery and is, therefore, objectionable. It takes a beautiful polish and should be used in cabinetwork. It makes an excellent fuel.

ENEMIES.

The beech is one of our healthiest trees, being comparatively free from severe injury by insects or fungi, although many species of the latter occur upon it. A few common insects that prey upon it are the fall webworm and forest tent caterpillar, as well as other caterpillars which do considerable damage to the foliage. Plant-lice and scale insects are sometimes abundant, especially upon cultivated beech.

Whenever insects of any kind occur in destructive numbers, specimens should be referred to the Bureau of Entomology of the Department of Agriculture for determination and advice regarding means of control.

Information concerning the numerous fungi and methods for combating their attacks can be obtained by application to the Bureau of Plant Industry of the Department of Agriculture. Letters of inquiry should always be accompanied by specimens. Beech drops are low annual plants parasitic upon the roots of beech trees.

Owing to the thinness of its bark, the beech is very susceptible to injuries from fire, and plantations should be well protected by fire lines.

REMARKABLE SALE OF RESERVE TIMBER

A Million and A-half Ties to be Cut, a Large Percentage from Material Once Without a Market, but Now Made Servicable by Preservation

FROM several aspects a striking interest attaches to the recent sale by the government of about 50,000,000 feet of timber on the Montana division of the Yellowstone Forest Reserve to a contracting company which will convert most of the timber into railroad ties.

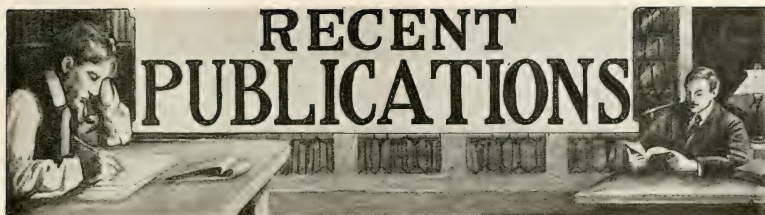
This is one of the largest sales ever made of government timber; the price is advantageous, and a large percentage of the cut will be of a species which a few years ago was without market value, namely, lodgepole pine. Further, it may be said with assurance that had not the preservative treatment of ties been shown to be both practical and economical, such a sale could not now have been made, for 60 per cent of the cut, or approximately 1,000,000 ties, is to be treated with preservatives by a process which experiment and trial have placed on a sound business basis.

The purchasers of the timber have contracted to supply the Chicago, Burlington and Quincy and the Northern Pacific railway companies with ties for a period covering three years. The timber for which they applied to the government consists of lodgepole pine, red fir, and spruce. A large proportion of the stand is lodgepole pine, which grows very densely. Consequently after all the specified timber has been removed, a plentiful stand of young trees will be left, which in a few years will again form a forest of merchantable dimensions.

The government will receive a stumping price of \$2.50 per thousand feet for the red fir and \$2.00 per thousand feet for the spruce and pine.

The story of the entrance of lodgepole pine into the timber market is an interesting chapter in the history of the use of forest products. Five years ago this tree was classed among the nearly worthless, inferior timbers growing in the northwestern states. It had never come into extensive use. Its liability to attack by fungus and to check in drying, its softness and lightness, and the large percentage of sapwood in its structure were disadvantages which seemed to handicap it permanently. Yet the possibility and the need of finding substitutes for scarcer woods had already led to the closer study of a number of unexploited species, and devices were being sought by which artificial treatment might be made to take the place of natural adaptability to a specific service.

Among these devices were improvements in seasoning methods and the use of preservatives. It was found that preservative treatment, which greatly prolonged the life of certain timbers, depends largely for its success upon the penetrability of the wood, which permits the preservative to enter the wood substance easily. The loblolly pine was seen to be exceedingly well adapted for preservative treatment, and also lodgepole pine, whose softness is combined with a high degree of permeability. In 1902 the seasoning and preserving of lodgepole pine was thoroughly taken up by the Forest Service, in co-operation with the Chicago, Burlington and Quincy Railroad and with the present purchasers of reserve timber in Montana. The results established its serviceability and thus opened a new field for the supply of ties, upon which the railroads are drawing so heavily.



Laws Relating to Public Lands in the Philippine Islands. Pp. 110, with line cuts. Published by Bureau of Insular Affairs, U. S. War Department, 1905. Washington, D. C.

The pamphlet here presented includes a complete synopsis of all the land laws of the Philippine Islands, methods of laying out claims, homesteads, etc., together with a resumé of all forest legislation. In that latter subject there is presented some valuable information regarding the native trees of the islands, their values, etc., together with various recognized rules for determining content, etc.

Primer Containing Questions and Answers on the Public Land Laws in the Philippine Islands. 1906.

Pamphlet Containing the Mining Laws of the Philippine Islands. 1906.

Free Patent Circular. 1906.

Sales Circular. 1905.

Circular Relative to Leasing of Agricultural Public Lands in the Philippine Islands. 1906.

In line with the pamphlet reviewed just above are the five publications here presented. Each pamphlet is issued separately in English and Spanish, and they are all designed to place before the people of the islands, and those interested there, authoritative information regarding the workings of certain portions of the land laws of the Philippines.

Yearbook, U. S. Department of Agriculture, 1905. P. 440. Illustrated. Government Printing Office, Washington, 1906.

By reason of a new ruling, the Yearbook of the Department of Agriculture has been divided into two separate bound parts, the first including the formal report of the Secretary of Agriculture to the President, and the reports of the various division chiefs to the Secretary, while in Part II. is includ-

ed the papers and discussions of various agricultural subjects which have made previous editions of the volume so popular throughout the country. The Yearbook for 1905 contains a very large number of articles, all of which are of interest, and should prove exceedingly helpful.

There are a number of valuable contributions on forest subjects, including "How To Grow Young Trees for Forest Planting," by E. A. Sterling; "Insect Enemies of Forest Reproduction," A. D. Hopkins; "Waste in Logging Southern Yellow Pine," J. Girvin Peters; "Prolonging the Life of Telephone Poles," Henry Grinnell; and an exceedingly clear and comprehensive article on the "Progress of Forestry in 1905," by Quincy R. Craft. The latter contains a very valuable resume of the forest legislation throughout the United States during the fiscal year of 1905.

Forty-Eighth Annual Report of the Missouri State Horticultural Society. pp. 451. Illustrated. Jefferson City, Mo., 1906.

The Forty-Eighth Annual Report of the Missouri Horticultural Society contains the proceedings in full of two of the most successful meetings in the history of the organization, those held at Versailles, June 13, 14, and 15, and at Kansas City, December 28, 29, 30, 1905. The volume contains a large amount of interesting and valuable information on horticultural subjects.

Forestry, A Profession for Young Men. By Samuel J. Record. Published by the Botanical Department of Wabash University, 1906.

In this little pamphlet Mr. Record defines the scope of the profession of forestry, indicates what studies will be of most value to the student preparing to enter that profession, states what advantages and disadvantages it offers, and includes a lot of good common sense advice relating to the subject, given in the guise of simple information.

DEPARTMENT OF THE INTERIOR, Washington, D. C., May 8, 1906. Sealed proposals will be received at the office of the United States Reclamation Service, Billings, Montana, until 2 o'clock p. m., June 20, 1906, for the construction of about 17 miles of canal, involving approximately 350,000 cubic yards of excavation. Plans, specifications, and proposal blanks may be obtained from the Chief Engineer, Reclamation Service, Washington, D. C., or from the Engineer, Huntley, Montana. E. A. HITCHCOCK, Secretary.

DEPARTMENT OF THE INTERIOR, Washington, D. C., April 26, 1906. Sealed proposals will be received at the office of the Supervising Engineer, United States Reclamation Service, Portland, Ore., until 3 o'clock p. m., June 28, 1906, for building the Cold Springs Dam, near Hermiston, Ore., including about 694,000 cubic yards of earth and gravel excavation, about 3,100 cubic yards of rock excavation, about 3,110 cubic yards of concrete, and about 55,000 cubic yards of rip rap and rock fill. Particulars may be obtained at the office of the U. S. Reclamation Service, at Washington, D. C., Portland, Ore., and Hermiston, Ore. E. A. HITCHCOCK, Secretary.

DEPARTMENT OF THE INTERIOR, Washington, D. C., May 12, 1906. Sealed proposals will be received at the office of the United States Reclamation Service, Klamath Falls, Ore., until 2 o'clock p. m., June 21, 1906, for the construction of 19 miles of canal, and 27 miles of laterals in Klamath County, Ore., with checks, turnouts, culverts, bridges and other appurtenances involving about 570,000 cubic yards of excavation, 1,550 cubic yards of concrete masonry, and about 35,000 feet B. M. of lumber. Plans, specifications and forms of proposal may be obtained by application to the Chief Engineer of the United States Reclamation Service, Washington, D. C., the Supervising Engineer, 1108 Union Trust Building, Los Angeles, Cal., or the Project Engineer, Klamath Falls, Ore. E. A. HITCHCOCK, Secretary.

DEPARTMENT OF THE INTERIOR, Washington, D. C., May 3, 1906. Sealed proposals will be received at the office of the Supervising Engineer, United States Reclamation Service, Portland, Ore., until 2 o'clock p. m., June 29, 1906, for the construction of about 25 miles of canal extending from the Umatilla River, near Echo, Ore., to the proposed Cold Springs Reservoir, consisting of the following work: About 700,000 cubic yards of earth excavation, about 6,000 cubic yards of rock excavation, about 2,300 cubic yards of concrete, and about 3,600 cubic yards of riprap, divided into two schedules. Particulars may be obtained at the offices of the United States Reclamation Service, Washington, D. C., and Portland, Ore. E. A. HITCHCOCK, Secretary.

DEPARTMENT OF THE INTERIOR, Washington, D. C., June 15, 1906. Sealed proposals will be received at the office of the Engineer, United States Reclamation Service, Billings, Mont., until 2 o'clock p. m., July 24, 1906, for furnishing about 405,000 pounds of steel bars for reinforcement of concrete. Particulars may be obtained by application to the Chief Engineer of the Reclamation Service, U. S. Geological Survey, Washington, D. C., or to the Engineer, Cody, Wyo. E. A. HITCHCOCK, Secretary.

DEPARTMENT OF THE INTERIOR, Washington, D. C., June 11, 1906. Sealed proposals will be received at the office of the United States Reclamation Service, Salt Lake City, Utah, until 3 o'clock p. m., August 30, 1906, for the construction of the Strawberry Tunnel, involving 18,600 cubic feet, more or less, of tunnel, the same being a portion of a system for the diversion of about 500 cubic feet of water per second from Strawberry River to the Spanish Fork Valley, Utah. Particulars may be obtained from the Chief Engineer of the Reclamation Service, Washington, D. C., or the Engineer, Salt Lake City, Utah. E. A. HITCHCOCK, Secretary.

DEPARTMENT OF THE INTERIOR, Washington, D. C., June 7, 1906. Sealed proposals will be received at the office of the Reclamation Service, 876 Federal Building, Chicago, Ill., until 2 o'clock p. m., July 6, 1906, and thereafter opened, for the construction of deep and shallow wells, suction pipes, pumping stations, siphons, concrete lined conduits, and fencing. Particulars may be obtained by application to the Chief Engineer of the Reclamation Service, Washington, D. C., or to the Engineer, Garden City, Kans. E. A. HITCHCOCK, Secretary.

DEPARTMENT OF THE INTERIOR, Washington, D. C., May 29, 1906. Sealed proposals will be received at the office of the United States Reclamation Service, Billings, Mont., until 2 o'clock p. m., July 10, 1906, for the construction of the Corbett Dam, a reinforced concrete structure, located on the Shoshone River about 8 miles northeast of Cody, Wyo. The structure will require about 10,000 cubic yards of excavation, 5,000 cubic yards of concrete, 9,000 cubic yards of earth and gravel embankment and the placing of 250,000 pounds of steel reinforcement. Particulars may be obtained from the Chief Engineer of the Reclamation Service, Washington, D. C., or from the Project Engineer, Cody, Wyo. E. A. HITCHCOCK, Secretary.

DEPARTMENT OF THE INTERIOR, Washington, D. C., May 29, 1906. Sealed proposals will be received at the office of the United States Reclamation Service, Browning, Mont., until 2 o'clock p. m., July 31, 1906, for the construction of about 14 miles of canal for the diversion of 850 cubic feet of water per second from the St. Mary River at a point about 35 miles northwest of Browning, involving the excavation of about 1,700,000 cubic yards of material. Particulars may be obtained at the office of the Chief Engineer of the Reclamation Service, Washington, D. C., or from Cyrus C. Babb, Engineer, Browning, Mont. E. A. HITCHCOCK, Secretary.

DEPARTMENT OF THE INTERIOR, Washington, D. C., June 15, 1906. Sealed proposals will be received at the office of the United States Reclamation Service, Billings, Mont., until 2 o'clock p. m., August 7, 1906, for constructing a pumping plant, involving about 15,000 cubic yards of earth excavation, 600 cubic yards of concrete, building about 2,000 feet of reinforced concrete pipe, furnishing 120,000 pounds of steel, and furnishing and installing a water-power pumping plant, consisting of two vertical-shaft pumping units and accessories, each unit having a capacity of 28 cubic feet of water per second, lifted fifty feet. The plant will be located near Ballantine Station on the Chicago, Burlington and Quincy Railway, 23 miles east of Billings, Mont. Particulars may be obtained from the Chief Engineer of the Reclamation Service, Washington, D. C., or the Engineer, Huntley, Mont. E. A. HITCHCOCK, Secretary.

DEPARTMENT OF THE INTERIOR, Washington, D. C., June 4, 1906. Sealed proposals will be received at the office of the United States Reclamation Service, Williston, N. D., until 10 o'clock a. m., July 9, 1906, for the installation of steam and electric pumping plants, and electric generating and transmission apparatus, including three pumping stations containing centrifugal pumps of 20 and 30 cubic feet per second capacity under heads of from 30 to 50 feet, driven by steam engines and electric motors aggregating 1,200 horsepower; also two 1,000 K. W. steam turbine generating units, 1,000 horsepower boiler plant and accessories, the necessary buildings and 3-mile transmission line, located in the vicinity of Williston, N. D. Particulars may be obtained from the Chief Engineer, U. S. Reclamation Service, Washington, D. C., or from H. A. Storrs, Electrical Engineer, Williston, N. D. E. A. HITCHCOCK, Secretary.

Forestry and Irrigation

H. M. SUTER, Editor

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JOHN

E. SHERIDAN



Doe. River Gorge, Tennessee. The Forests on the steep slopes of this beautiful gorge are being rapidly destroyed by the fire and the axe.

FORESTRY AND IRRIGATION

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NEWS AND NOTES

New
Forestry
Association
the *Paper Mill* has the following to
say:

Of the Northern New
York Forestry Associa-
tion recently organized

"There is considerable interest throughout this section in the new association just formed for promotion of common-sense methods in forest culture in the Empire State. It will be remembered that many members of the trade are interested in this association.

"That the efforts of the new organization will be intelligently directed and will result in much good for the important object involved is apparent at a glance. The men interested are among the leaders in the section's activities, and they will see to it that everything possible is done to help the people toward the right point of view in this matter.

"The plan of campaign is not fully mapped out as yet, but it is understood that one portion of the plan in consideration is to disseminate literature compiling from the highest sources facts and figures to prove that the European system of forest culture, which permits the securing of no inconsider-

able revenue through the judicious cutting of ripened timber, is better than the present 'let-alone' policy which doesn't do the State or anybody any good. The idea of allowing the forest to wallow in its own decay, without the right to take a single stick of timber therefrom, is an antiquated one, a fact which is better realized in Northern New York than in some other sections of the Empire State.

"It must not be assumed, however, that the newly formed association for one moment stands for the wholesale destruction of the forest. Its members are not so foolish. Time was, a generation or so ago, when members of the trade as well as lumbermen, grown reckless through the accustomed sight of much profusion, were wasteful in their methods, though the brunt of these practices must be laid far more at the doors of lumbermen than of the trade. Certain operators were accustomed, after the first and second cuttings, which weeded out about everything worth while, to burn the denuded tracts over and leave of them only blackened wastes. There has not been the semblance of these practices among the trade in many

years, though certain lumbermen are still sinners in this regard.

"Now this new association, to which belong many members of the trade and many enlightened lumbermen, intends to war upon these practices just as much as it does upon the foolish 'let-alone' policy. What the members of this organization desire is to institute in Northern New York a system of forest preservation and culture in line with common sense. In searching for such a system their eyes fall naturally upon the forests, splendid assets under governmental protection, as in Austria and Germany. The association, too, is in strict sympathy with the efforts along lines that are being made by the Government.

"The trade's attitude in the matter of timber cutting has for years been along the line of retrenchment and the conservation and replanting of denuded wastes. The act of the Remington-Martin Company, of Norfolk and Watertown, in buying a great tract upon which forest culture is to proceed annually, years to pass before any cutting is done, is a fair sample of how the mill owners of this section feel about it.

The Northern New York Forestry Association, whose principal office is at Watertown, was incorporated June 29, to spread sound information in relation to the protection of the forests and the cultivation of forests on waste lands throughout Northern New York. The directors are: O. B. Tappan, of Potsdam; G. H. P. Gould, of Lyon Falls; W. B. Van Allen and W. O. Ball, of Carthage; D. C. Middleton, Joseph Atwell, W. W. Conde and Elon R. Brown, of Watertown; C. O. Roberts, of Philadelphia; T. B. Bas-selin, of Croghan; Thomas Spratt, of Ogdensburg, and L. P. Hale, of Canton.

Forests and Paper Supplies

That many newspaper proprietors are not alive to the danger that threatens them in the shape of a scant supply of paper or already exorbitant and increasing prices for that material

was the substance of a statement made recently by Lord Northcliffe (Sir Alfred Harmsworth), who arrived on the Kaiser Wilhelm der Grosse, of the North German line, as reported by the *Paper Trade*. Lord Northcliffe also said that through having acquired a large tract of forest land in Newfoundland he would be able to protect not only his own large interests but those of a dozen of the largest newspapers in the United States as well. He is the proprietor of 58 newspapers and periodicals.

He said: "Broadly speaking, I consider that newspaper owners, as a rule, have not sufficiently considered the great difficulties that lie ahead of them in securing their paper supplies.

"My eyes were opened to the situation at the time of the Boer War, when the price of paper rose universally. From that moment I made up my mind that my business should become independent of paper shortages, whether real or promoted by trusts, and I have been fortunate enough to secure from the Government of Newfoundland a vast concession of forest land, sufficient, I believe, to protect not only my own business, but a dozen other of the largest businesses in the United States, a concession which will, I believe, also bring added prosperity to that wonderful colony."

New York Forestry

The Forest, Fish and Game Commission's recent trip through the

Adirondacks was most encouraging to Senator Jotham P. Allds and his associates, both as to the state of things in Adirondack Park and the progress made in scientific forestry on certain of the State tracts. Colonel Fox's policy of encouraging reforestation by transplanting young trees and by planting seed is proving more and more of a success as time goes on. The work accomplished by the State's experiments in the past five years has been remarkably successful.

The first plantation under the direction of the State was on Timothyberg Mountain, in the Catskills, in 1901.

Scotch and white pine and Norway spruce were planted in groves at the foot and top and in rows up the side of the mountain. At present these trees are four feet high. When set out they were but a foot high.

The next plantation was started in 1902, 250,000 trees being set out near

set out along the railroad leading from Lake Clear to Saranac Lake.

Four miles from Paul Smith's is located the fourth plantation. Ninety-eight per cent. of the trees set out are growing rapidly. Last fall another plantation was made on the property of the State hospital at Raybrook and



J. B. LIPPINCOTT

In whose resignation the United States Reclamation Service has lost the services of a splendid engineer.

Lake Clear Junction in the Adirondacks. The trees included considerable Norway spruce, Scotch pine, fir and larch. The average growth of these trees last year was eighteen inches, some growing fully two feet. In the same year 250,000 trees were

still another was established near Placid. The work of the forestry department this spring, under the supervision of Abraham Knechtel, has been confined to additions to the plantations made and in testing tree seeds. The forestry department reports that seeds

planted last fall indicate by their development that this method of reforestation is a success.

The State owns three nurseries. One is at Saranac Inn Station, another as Wawbeek and the third at Axton.

There are several private plantations in the Adirondacks. One of these, at Northville, is owned by Jas. S. Cole and the Saranac Inn Association owns another. The Delaware and Hudson Company has an experimental nursery at Wolf Pond.

About the Cotton Tree

According to Mr. Herbert J. Webber, chief of the plant-breeding laboratory of the U. S. Department of Agriculture, cotton planters in the United States need have no fear that the tree discovered by J. R. Spence, of Deesee, India, is going to put them out of business. He says the new cotton tree recurs as often as Christmas, and with a proportionate amount of noise.

Speaking of this latest "discovery," Mr. Webber says: "So far as this country is concerned, the Spence tree is not worth 5 cents. In my opinion, the whole thing is a farce. Whatever value, if any, the tree may possess, will be a purely local one, and of absolutely no commercial value to people outside of India.

"Trees of that kind are always being discovered. The last was in Australia, and one was also recently found in India; neither of which, however, revolutionized the cotton-growing industry.

"For seven or eight years the department has been making experiments with cotton trees, and none of them has amounted to anything. The trees will not stand the severe climate in this country and always freeze. I have seen them grow as high as this room, but never have they put forth a single boll.

"We have tried hybridizing these foreign trees with out native plants, thinking that in this way we might secure a plant that did not require so long a time to reach the blooming age,

but all of the efforts have been unavailing.

"It takes two years to bring a cotton plant to the period when it will bear, and several more to make it a paying investment. Consequently, a tree from a tropical country stands no chance here. The only successful result that has attended our endeavors along this line of breeding is to have increased the length of the plant's staple.

"Our agent in India has secured some of the seed from this new tree of Spence's, and we shall make experiment with them. I am not at all optimistic of the outcome.

"These wonderful stories about the crops to be raised from these so-called new trees, are always based upon the growth of one or two trees, and are generally sent out in advance of some business scheme.

"It has been so time and again, and will probably continue so long as cotton is grown.

Change of Quarters

The removal of the principal offices of the Reclamation Service from the Hooe Building to the Munsey Building in Washington marks the termination of the period of infancy of the Reclamation Service and its separation from the parent body, the Geological Survey.

On the passage of the Reclamation Act on June 17, 1902, the Reclamation Service was organized by the Secretary of the Interior as a part of the Hydrographic Branch of the Geological Survey, as the work to be performed was a natural outgrowth of the investigations which had been carried on for many years by that bureau. The principal engineers connected with this work formed the nucleus of the new organization, and other men were obtained from time to time as needed, from the eligible list of the Civil Service Commission.

On the fourth anniversary of the formation of the Reclamation Service it has definitely broken away by moving into new quarters. During these

fours the organization has increased from less than a dozen men to over four hundred engineers and assistants, carrying on work throughout widely scattered localities in the arid West. Contracts have been let and work is under way involving the expenditure of upwards of \$25,000,000, and other contracts are being prepared which will necessitate the expenditure in all of nearly \$40,000,000. There are now working for the contractors nearly 10,000 men, and the Reclamation Service has working directly for it over 2,000 men, including day laborers and mechanics. The monthly expenditures aggregate about \$1,000,000, having gradually increased until they are now practically at the maximum. It is not probable that there will be further expansion, but, on the contrary, a considerable consolidation and reduction of force as the larger works are completed.

The rapid growth of the Reclamation Service is indicated by the annual expenditures. For the fiscal year ending June 30, 1903, these were a little over half a million dollars; for 1904, one and one-half millions; for 1905, three and three-quarter millions; and for the year ending June 30, 1906, very nearly eight millions, the greater part of this amount being expended during the months of May and June, when the expenditures reached over a million dollars each.

Allotment of Funds

The Secretary of the Interior has adjusted the allotments of the reclamation fund in accordance with recent estimates from the General Land Office as to the probable amount of this fund during the next two years. The fundamental principle has been to allot the fund to the projects where the work is now furthest advanced and where returns to the fund may be expected in the near future.

The surveys and examinations already made show that at least \$100,000,000 could be used to advantage in various parts of the arid West. The total fund which will be available

from the proceeds of public lands for the years 1901-8 is estimated by the General Land Office to be a little over \$41,000,000. In order, therefore, to continue the work, it is necessary that this money, or as much of it as possible, be invested in works which will begin to yield returns to the fund at the earliest possible date, so that the money may be used over again as soon as possible for the construction of other works.

In several of the projects a number of years must elapse before the works will be completed. Such projects will not be revenue producing for some years. On the other hand, in Nevada the work has advanced to a point where upwards of 50,000 acres are already under irrigation and revenue may be expected soon from this area. Other projects are nearing completion and every possible effort is being made to finish these so that they may begin to repay the cost.

Reclamation Work in Oregon

Oregon leads in the Government work of reclamation, both in the amount of money contributed to the reclamation fund through the disposal of public lands in that State, and through the amount of money set aside for the construction of works within its borders.

It also leads in the difficulties encountered in getting the work started. Although the natural advantages of the State are great and appear attractive on first sight, yet it has required more time and energy to find feasible reclamation projects than elsewhere. This is due to a number of conditions, such as legal complications, the lack of transportation facilities, and the ownership of land in large bodies by cattle companies and syndicates who have acquired vast tracts under the Federal Land laws.

Immediately after the passage of Reclamation Act on June 17, 1902, investigations were begun throughout the State. Public meetings were held by interested citizens and a large number of schemes suggested. One after

another these were found to be impracticable from lack of dependable water supply, or were tied up in complications of vested rights to water, or entangled with large land grants. Disappointment followed most of the attempts, but finally out of the large number of projects examined the Secretary of the Interior was able to declare feasible the Klamath project in the southern part of the State on the border of California, and the Umatilla project in the northeastern part of the State.

For the Klamath project the Secretary of the Interior set aside the sum of \$1,400,000, of which \$2,000,000 are now available and are being used, the remainder, \$2,400,000, to be used in the future.

For the Umatilla project \$1,000,000 have been set aside and contracts are being let for the expenditure of that sum. This is the first unit of the proposed John Day project taking water from the river of that name and carrying it across the Blue Mountains to the fertile slopes south of Columbia River. This project will cost upwards of \$10,000,000 and will require many years for completion. The first part, however, near Umatilla River can be carried out within a relatively short time.

Funds for Klamath Project

The Secretary of the Interior has transferred another million dollars to the reclamation fund for the Klamath project, making \$2,000,000 now immediately available for construction. There has already been set aside the sum of \$4,400,000 for this project, of which the above stated \$2,000,000 is now being expended.

The greater part of this will be

spent in Oregon, a small portion of irrigable land being across the line in the State of California. Work is being energetically pushed on the construction of the outlet tunnel from Klamath Lake. Two lines of railroad are being built from points in California to the irrigated region in the Klamath project.

Joy and Sorrow

There is some rejoicing and much sorrowing among the farmers under the first forty-five miles of the interstate canal, North Platt project. The cause of this paradoxical situation is that the month of June saw the completion of this section of the great ditch, the successful passage of water to the end of the constructed canal and its delivery for irrigation purposes, and that like the foolish virgins a large number of settlers were not ready for it.

On June 17th the water in the canal had reached a point at about the 41st mile, and on June 13th it had reached the end of the 45th mile. The Whalen Falls Canal Company is drawing at all their head-gates a maximum of about five cubic feet per second, with an average of probably not to exceed three cubic feet per second. There has been coming into the headgate a maximum of about 150 and a minimum of about 30 cubic feet per second.

Some 1,200 acres of land are in crop and have been irrigated from the canal; the balance of the 20,000 acres is not prepared to receive it. The lateral systems under the Whalen Falls Canal, and through which water is to be taken from the Government canal, are not built, with the exception of one at the 25th mile, which was opened about the middle of June.



FOREST SERVICE APPROPRIATION

Congress Gives One Million Dollars for Present Fiscal Year

THE rapid and substantial growth of the United States Forest Service is clearly set forth in that portion of the Agricultural Appropriation Bill for 1906-1907 which provides for its administration. One million dollars is the total amount appropriated, and is a striking testimonial to the administrative ability of the Forester, Mr. Gifford Pinchot, as well as to a keener appreciation by Congress of the importance of forestry to the nation. The text of the bill as relating to forestry is as follows:

Salaries, Forest Service: One Forester, who shall be chief of Bureau, three thousand five hundred dollars; two clerks class four, three thousand six hundred dollars; four clerks class three six thousand four hundred dollars; three clerks class two, four thousand two hundred dollars; five clerks class one, six thousand dollars; seven clerks at one thousand one hundred dollars each, seven thousand seven hundred dollars; nine clerks, at one thousand dollars each, nine thousand dollars; nine clerks, at nine hundred dollars each, eight thousand one hundred dollars; nineteen clerks, at eight hundred dollars each, fifteen thousand two hundred dollars; twenty clerks, at seven hundred dollars each, fourteen thousand dollars; thirteen clerks, at six hundred dollars each, seven thousand eight hundred dollars; one draftsman, one thousand eight hundred dollars; two draftsmen, at one thousand four hundred dollars each, two thousand eight hundred dollars; two draftsmen, at one thousand two hundred dollars each, two thousand four hundred dollars; four draftsmen, at one thousand dollars each, four thousand dollars; one artist, one thousand dollars; one photographer, one thousand four hundred dollars; one photographer, one thousand two hundred dollars; one photographer, one thousand dollars; two mes-

sengers, at seven hundred and twenty dollars each, one thousand four hundred and forty dollars; three messengers, at seven hundred dollars each, two thousand one hundred dollars; three messengers, at six hundred dollars each, one thousand eight hundred dollars; three messengers, at four hundred dollars each, one thousand two hundred dollars; one carpenter, one thousand dollars; one carpenter, seven hundred and twenty dollars; three watchmen, at seven hundred dollars each, two thousand one hundred dollars; one electrician, seven hundred dollars; one skilled laborer, seven hundred dollars; in all, one hundred and twelve thousand eight hundred and sixty dollars.

General Expenses, Forest Service: To enable the Secretary of Agriculture to experiment and to make and continue investigations and report on forestry, forest reserves, forest fires, and lumbering; to advise the owners of woodlands as to the proper care of the same; to investigate and test American timber and timber trees, and their uses, and methods for the preservative treatment of timber; to seek, through investigations and the planting of native and foreign species, suitable trees for the treeless regions; to erect necessary buildings: *Provided*, That the cost of any building erected shall not exceed one thousand dollars; for all expenses necessary to protect, administer, improve, and extend the national forest reserves, and officials of the forest service designated by the Secretary of Agriculture shall, in all ways that are practicable, aid in the enforcement of the laws of the States or Territories with regard to stock, for the prevention and extinguishment of forest fires, and for the protection of fish and game.

That the forest-reserve special fund provided for in section five of the Act approved February first, nineteen hun-

dred and five, entitled "An Act providing for the transfer of forest reserves from the Department of the Interior to the Department of Agriculture," shall continue until otherwise provided by law; but after June thirtieth, nineteen hundred and eight, it shall not be expended except in accordance with specific estimates of expenditures to be made from said fund for the succeeding fiscal year, to be submitted by the Secretary of Agriculture with the estimates of appropriation in the annual Book of Estimates.

That ten per centum of all money received from each forest reserve during any fiscal year, including the year ending June thirtieth, nineteen hundred and six, shall be paid at the end thereof by the Secretary of the Treasury to the State or Territory in which said reserve is situated, to be expended as the State or Territorial legislature may prescribe for the benefit of the public schools and public roads of the county or counties in which the forest reserve is situated: *Provided*, That when any forest reserve is in more than one State or Territory or county the distributive share to each from the proceeds of said reserve shall be proportional to its area therein: *And provided further*, That there shall not be paid to any State or Territory for any county an amount equal to more than forty per centum of the total income of such county from all other sources.

For ascertaining the natural conditions upon and for utilizing the national forest reserves; and the Secretary of Agriculture may, in his discretion, permit timber and other forest products cut or removed from the forest reserves of the United States, except the Black Hills Forest Reserve in South Dakota, to be exported from the State, Territory, or the district of Alaska, in which said reserves are respectively situated: *Provided*, That the exportation of dead and insect-infested timber only from said Black Hills Forest Reserve shall be allowed until such time as the Forester shall certify that the ravages of the destructive insects in said reserve are

practically checked, but in no case after July first, nineteen hundred and eight; and hereafter sales of timber on forest reserves in the State of California shall in every respect conform to the law governing such sales in other States, as set forth in the Act of June sixth, nineteen hundred (Thirty-first Statutes at Large, page six hundred and sixty-one); and hereafter all moneys received as deposits to secure the purchase price on the sale of any products or the use of any land or resources of the forest reserves shall be covered into Treasury in the manner provided by section five of the Act of Congress approved February first, nineteen hundred and five, entitled "An Act providing for the transfer of forest reserves from the Department of the Interior to the Department of Agriculture," and the fund created by that Act shall be available, as the Secretary of Agriculture may direct, to make refunds to depositors of money heretofore or hereafter deposited by them in excess of amounts actually due to the United States; and hereafter all moneys received as contributions toward cooperative work in forest investigations shall be covered into the Treasury and shall constitute a special fund, which is hereby appropriated and made available until expended, as the Secretary of Agriculture may direct, for the payment of the expenses of said investigations by the Forest Service and for refunds to the contributors of amounts heretofore or hereafter paid in by them in excess of their share of the cost of said investigations, for the employment of fiscal and other agents, clerks, assistants, and other labor required in practical forestry, in the administration of forest reserves, and in conducting experiments and investigations in the city of Washington and elsewhere, and he may dispose of photographic prints (including bromide enlargements), lantern slides, transparencies, blue prints, and forest maps at cost and ten per centum additional, and condemned property or materials under his charge in the same manner as provided by law for other bureaus; for

collating, digesting, reporting, illustrating, and printing the results of such experiments and investigations; and for the purchase of all necessary supplies, apparatus, office fixtures, law books to an amount not exceeding five hundred dollars; for freight, express, telegraph, telephone charges, electric light and power, fuel, gas, ice, washing towels, and traveling and other necessary expenses, eight hundred and eighty-seven thousand one hundred and forty dollars of which sum not to exceed thirty-five thousand may be used for rent. And the employes of the Forest Service outside of the city of Washington may, in the discretion of the Secretary of Agriculture, without additional expense to the Government, be granted leave of absence not to exceed fifteen

days in any one year, which leave may, in exceptional and meritorious cases which such an employe is ill, be extended, in the discretion of the Secretary of Agriculture, not to exceed fifteen days additional in any one year.

Total for Forest Service, one million dollars.

In the emergency appropriation for the Bureau of Animal Industry there was the following provision:

For Forest Service: For the erection of a wire fence and necessary sheds on the Wichita Forest and Game Preserve, to provide a range for a buffalo herd presented by the New York Zoological Society, and to provide for the maintenance of said herd, fifteen thousand dollars, of which sum not to exceed five hundred dollars shall be expended in buildings.

SIZE OF IRRIGATED FARMS

Amount of Land Needed in Northwest to
Make it Profitable to Average Small Owner

BY

PROF. F. B. LINFIELD

Director Montana Experiment Station.

THE question has been asked: What area of land under the irrigation ditches constructed by the Reclamation Service should be considered as the farm unit? This question involves yet others. What is the purpose of the Government in undertaking this reclamation work? What class of people does it aim to help? I think all will agree that the man of large means and large capacity should not have first consideration, but rather the man of small means and capacity. The wage earners and laborers rather than the employer of labor. The aim of the Government should be to make it possible for the man of small means to build himself a home in a healthy atmosphere where the social and educational advantages are such as to develop the best type of citizenship.

Next, what area of land under irrigation will support a man and his family in comfort and also provide means for using educational opportunities for his family? The first part of this question can be answered only by asking another. What is the average yearly income of the average working man? While wages are good in Montana, probably \$500 to \$600 per year will be an outside wage obtained by the average laborer in the country towns. From this, house rent and all living expenses have to be paid. Now what will 40 acres of irrigated land return under careful, thorough and intelligent management? To be equal to the wage proposition it should provide equal or better wages, interest on the investment, and keep or maintenance of farm machinery and horses.

Something on interest and wages will be returned by the home being provided on the farm, and besides much of the fruit, all the vegetables and the wheat for flour may be grown on the farm and obtained without any cash outlay. The same is true for the poultry and the eggs, and for the milk, cream and butter needed. With

five miles from Bozeman, last fall threshed 75 bushels of wheat per acre from a 70 acre field and sold the crop for \$45 per acre; \$10 per acre would pay very well for the labor and expense of growing and harvesting the crop. Thus the gross return from 40 acres would be \$1,800, and the net return \$1,200. One hundred bushels of



Prof. F. B. Linfield, Director Montana Experiment Station, Bozeman, Montana.

the saving in rent and on the living grown on the farm, fully half a laboring man's expense is produced directly from the farm with but little or no cash outlay.

But what will a 40 acre tract under irrigation produce? A few illustrations will perhaps best answer the question. George Allen, living some

oats per acre is a common crop for the good farmer. At 1 cent a pound, this means \$35 per acre. If we again allow \$10 per acre for expense, it would give \$1,200 as a gross return, and \$800 as the net return from 40 acres of ground.

In the Yellowstone valley five to six tons of alfalfa hay per acre is a

common crop. At \$4 per ton this is \$20 to \$24 per acre; \$8 per acre will be a large price for producing and handling this crop. At six tons per acre, this would give a gross return of \$560 from 40 acres of land.

If this alfalfa hay was fed to stock, particularly to dairy cows, these returns could be nearly doubled.

The writer has pastured two milk cows on one acre of ground and obtained 200 pounds of butter fat. At 20 cents per pound, this returns \$10 per acre, or \$1,600 from 40 acres. The above crops can be produced for a minimum outlay of labor. A man and a team could do practically all the work. In the above illustrations the returns from but one crop were considered; but a combination of many of the crops mentioned would be the ideal farm practice. If livestock were handled this would spread the work over the year and the returns on these variety crops will be in proportion of the acreage of each, and would give the maximum return of from \$800 to \$1,600 per year from the 40 acres, in addition to providing a home and many of the living expenses.

In the above estimate none of the crops expensive to raise have been considered. Potatoes, sugar beets, garden truck and fruit of all kinds

call for larger outlay of labor, but they are correspondingly larger producers and give greater returns per acre.

Something in these kinds of crops should be grown. However, the extent of these crops that might be grown will be determined by the time available for properly caring for them. To yield the largest returns, the work of the farm should be so planned as to afford profitable employment the year around. The farmer on 40 acres has to be a manufacturer, a concentrator of farm products as well as a producer of raw material. When properly managed, this will bring not alone income, but larger profits.

I have known many families in the East raised on a farm of 50 acres with comfort, with sturdy bodies and vigorous, active minds. From 20 acres of Montana's irrigated land I have seen more grain and hay produced than on many of the best of these 50 acres farms. Forty acres is enough. Rightly farmed, it will give any man a comfortable living. It will give to every man a neighbor at his door. It will give to the country resident all the advantages of the urban resident without his disadvantage. It will bring to the rural home the best social, educational and religious advantages.

PARANG AND COGONALES IN THE PHILIPPINES

BY

WILLIAM M. MAULE

Forester, Philippine Bureau of Forestry.

FROM earliest times man, through various motives, has wrought havoc with the forest. The natural outlines and distribution of forest areas are determined largely by geographical location and the physiological features, or, in short, the factors which determine climate. Everywhere we find these outlines more or less modified by artificial influences.

There is little doubt but the greater portion of the grass areas and semi-open "parang" lands characteristic of many portions of the Philippine archipelago are due to the fixed custom of indiscriminately clearing and burning for purposes of temporary planting or for the chase.

The open character of certain forest areas leads one to believe that the geo-

logical formation interferes with tree growth. Such areas, however, are small and unimportant when compared with those whose open condition we attribute to the interference of man.

TYPES.

According to cover, we may readily distinguish three types of public lands whose formation has been effected by artificial means and is, therefore, inconstant. These are: Closed forest,

forested, but subsequently cleared, planted, and are now abandoned and reverting back to forest cover.

The first tree species to appear are usually of little value as timber producers, but, as we shall see later, serve their purposes well as fosters.

"Cogonales" may be called an early "parang" stage. They are lands free at first of tree growth and heavily set with "cogon" (*Imperata arundinacea*), a perennial grass from three to five



Parang.

semi-open or "parang" and open grass lands or "cogonales."

This paper will not attempt to deal with the first type, but will briefly consider the more open lands.

Vidal, who was the first to adopt the Tagal word "parang" as a technical term, defines it as "land covered with brushwood and invading species which have substituted the original forest species." These areas in general represent tracts which were originally

feet high. The relative proportion of these areas is quite variable. In certain provinces the open lands are insignificant, while in others they may occupy as much as 30 per cent. of the total area. Having been selected primarily for the growing of crops, such soils represent the most fertile portion of the non-cultivated areas, and, as a rule, occupy the low rolling foothills adjacent to the cultivated plains, which they separate from the upland forests.

DAMAGE.

At the present time, the greatest damage wrought to our Philippine forests is the making of clearings, and especially those of a transitory nature. The natives are well aware of the fertility of cleared and burned forest areas, and do not hesitate to sacrifice a good stand for the mere purpose of growing one or two crops of cereals. In some instances a portion of the timber is utilized, but the general rule is to cut and burn.

Tranistory clearings are those usually planted with cereals or other annuals, and are held at the most but two or three seasons, when they are abandoned to nature and new areas selected. In this manner, the open lands increase year by year to join the "cogonales."

On the other hand, where soil and climate are favorable, we find clearings made with a view of permanency, where the lands are cultivated and planted to permanent crops, such as cocoanuts, abaca, rubber, etc., thereby adding to the wealth of the community. Such clearings are justifiable.

Inasmuch as we find the temporary clearings more wasteful than those held permanently, so are we able to distinguish two classes of people making them. The former comprise a less law-abiding class, whose habits are semi-nomadic, while the latter are more frugal and industrious.

SEASON OF MAKING.

As may be inferred, the making of clearings is not especially difficult, when advantage is taken of the dry season, usually during February, March, April, and May, at which period the newly felled timber rapidly becomes dry and burns with ease.

Planting is done early in June, at which season the growth of crops is favored by copious rains, which continue until September. The planter usually erects a small house on his claim, where he bides the time and watches the crop until harvest, after which he retires to an adjoining barrio.

On the advent of the following season, only a small portion of former claims are replanted, as the fresher soil of a new clearing is preferred. Lands once set with cogon, especially those of the hill regions, are of little value when reclaimed. The soil, having lain long exposed to erosion, becomes thin and unproductive. The heavy root stalks, by which cogon reproduces vegetatively, render it difficult to eradicate. This, together with the fact that forest soils are fresher and more easily worked, explains why the latter are preferable to the former. On private lands which are level and retain their fertility, cogon areas have been reclaimed for agricultural purposes. The Bureau of Agriculture employ methods by which cogon is destroyed in one season. The land is plowed and sown with legumes, at a cost averaging \$3.00 per acre.

ABANDONED.

Clearings which are abandoned after one season still retain a certain number of stumps which will coppice; the soil is loose and more receptive to seeding than on those areas which have been planted for a longer period. Reforesting by means of coppice alone, however, cannot be relied upon, as but few species sprout at all, and, if they do, rarely attain tree size. The chief value of coppice here lies in the protection which they afford the soil in preventing a rapid evaporation of soil moisture, erosion, and, finally, the entrance of cogon. The value of a leaf cover in dissipating the heavy rain fall is well shown by the accompanying illustration.

Clearings which have been planted for two or three seasons and abandoned are found to have lost all volunteer growth; the soil becomes dry and is seldom receptive to natural seeding.

Burns-Mordoch, Conservator of Forest of the Federated Malay States, writing of "Lalang" (*Imperata cylindrica*), a closely related species of "cogon," says:

"Cleared land in this country if not constantly kept clean becomes covered

with "Lalang" (*I. cylindrical*), the "Thetke" grass of Burma, but this grass here grows with such strength as to prevent young trees from taking hold. It is liable to fires and is benefited by them, so much so that in large

NATURAL REFORESTING OF CLEARED AREAS.

A study of natural reforestation of cleared areas presents an interesting example of Nature's methods and



Clearing in Forest Planted One Year.

"Lalang" wastes that are regularly burnt over, it is doubtful if natural reforestation would ever occur. The cost of regular plantations is increased enormously, owing to the necessity of most thorough clearing."

shows the comparative ability of various species to endure light, or, more properly, drought.

The most successful examples of natural reforestation, because they are better protected from fibre and other

harmful influences, are found on the smaller, isolated areas throughout the forests. The following specific example will be cited as one of several ways by which natural reforestation takes place.

In effecting the transition back from clearings to high forest, the initial step is taken by a small, woody plant, "Cupao-cupao" (*Flemingia strobilifera*). This plant is one of the very few that can endure extended drought, and not only grows well among the cogon, which it gradually replaces, but is seldom killed by fire. After establishing itself well and affording a certain amount of shade, which conserves small amounts of moisture, we find conditions which will permit the entrance of Bayabas (*Psidium guayava*) and Alalangad (*Albizia* sp.), either of which are trees of the open or semi-open, and are intermediary in effecting steps from open grass lands back to forest cover.

An important and valuable characteristic of these species is that they will reproduce vegetatively, and are thereby of service where the parched soil prevents the germination of seeds.

Clearings having become set with the drought-enduring species, such as those noted above, pave the way for the better forest species and gradually partake of a nature peculiar to the surrounding forest.

In the Remban district of the Malay States, "Tembusa" (*Fagraea fragrans*) is one of the few trees which is able to grow on "Lalang" or cogon areas, and which it soon conquers.

FIRE ON GRASS LANDS.

Under the caption of clearings may properly be included the destructive influence of fires, which annually—or more frequently—sweep over the open grass lands. These fires are usually confined to the dry months of February, March, April, and May, and during the rainy season which immediately follows there springs up tender grass suitable for grazing. At this season deer are attracted to the open and are more easily hunted. Such fires

are usually started by hunters, who have held the custom from remote times. Owing to the rapidity with which these fires travel, driven before the wind, and the difficulty of finding the author, the practice remains a hard one to overcome.

Recent experiments by the Bureau of Government Laboratories show that cogon will furnish good paper material, and in the event of its extensive use for such a purpose, doubtless the natives, with view to reaping profit therefrom, will protect these areas from fire.

While it would be of advantage to place fires under control of all areas, it is especially important to do so where the grass lands terminate abruptly at the edge of high forest, where each succeeding fire causes them to recede.

During each rainy season, a certain amount of tree growth springs up on the grass lands. Some of the more hardy survive, but the majority succumb to drought or are killed by succeeding fires. Many rocky slopes are naturally seeded with Molave (*Vitex littoralis*). This species is moderately drought-enduring, and, were it not killed by fire, would no doubt spread gradually over considerable areas.

CONTROL.

The control of artificial clearings such as usually follow excessive cuttings has been found much more simple than that of firing the open grass lands, and there is little doubt that the latter causes less direct damage to the forests.

The forest service of India, in dealing with much the same conditions as exist here, has found the problem of fire protection to be one of the most difficult with which it has to contend. The people were taught that injury to the forest was an offense. Large areas were formerly destroyed by fire and axe in order to gather a few uncertain crops of cereals. The grazing question with which they had to deal—and one which is important in many countries—need scarcely be considered here. India has found that a gradual

introduction of strict protective measures has resulted in less friction than when the question has been attacked abruptly.

The question of influence of forests in conserving the water supply, while being an important one, cannot be so grave here as is experienced in countries whose climate allows the accumulation of a thick humus to cover the forest floor, and where rainfall is less abundant.

The warm climate and continued moisture of these islands promote rapid decomposition of the forest litter, so that the small quantities that

damp soil, even though practically void of humus, collect and conserve immense quantities of water during the rainy seasons, gradually releasing it during the succeeding dry months.

Nowhere has the writer seen the effect of deforestation so pronounced as in the southern portion of Rizal province. Here the watersheds which were formerly forested have long been exposed and are now mixed parang and cogonales. The rolling aspect of the country is extremely dry during three or four months of the year, at which season but few streams find their way to the lake. Certain of the ravines



Protective Value of Crown Cover Against Heavy Tropical Rains.

are allowed to accumulate conserve an insignificant quantity of water.

The question of erosion is an important one, not only regarding its influence on future forest growth, but from its bearing on agricultural soils of the low lands. Beyond the considerable benefit which the dense cover of tropical forest affords, by dissipating the force of heavy seasonal rains, wherever such may occur, and by retarding subsequent rapid evaporation, factors largely determining or regulating the "flow-off" are topographical, and the character of the soil of the broad forested slopes, with their

farther inland are still wooded and here water may be found throughout the year, but during their course through the open country the smaller streams are gradually absorbed and only the larger ones find their way to the lake.

One would naturally expect that the grass-covered areas would be of great value in retarding erosion, and such would be the case were they not burned over during the dry months just prior to the rainy season, which exposes those areas to the beating rains.

The question of forest protection is one that stands among the foremost

in a forest policy, and, among the various conditions studied from which to draw conclusions, the status of the people whom it most concerns is not the least important.

The wasteful custom of making clearings in these islands is deeply rooted and is one that has been practiced for years with scarcely any re-

straint. Very satisfactory results are ensuing from making arrests, which seems to be the most effective way of solving the problem. During the past two years many arrests have been made, which has resulted in an appreciable decrease in the making of clearings.

PUMPING WATER

Fourth Paper—Suggestions for the Construction of Small Pumping Plants for Irrigation—Kind of Wells Adopted for Securing Water from Gravels

KIND OF WELLS ADAPTED FOR SECURING WATER FROM GRAVELS.

The most economical well for securing water in the quantities needed for irrigation is a well from 12 to 15 inches in diameter, extending into the water-bearing gravels 30 to 60 feet, according to the thickness of the gravels at the place where the well is drilled. Strainers for these wells can be made of slotted galvanized iron. The perforated metal should be placed opposite all the coarse gravels, or at a depth of 10 feet below the surface of the water. These strainers can be made by any mechanic by punching $\frac{1}{8}$ by 1 inch slots into heavy galvanized iron and then riveting the sheets into cylinders of the proper diameter. The cylinders should be rolled in such a way that the burr made by punching the slots will come on the outside of the finished casing, so that the slots will be vertical. A much better strainer can be made by purchasing the metal in sheets already perforated. For this purpose steel sheets 48 by 120 inches in dimensions, perforated with hit and miss slots, 3-16 by 1 inch, and galvanized after the perforations are made, will make ideal strainers. When rolled into cylinders these sheets form a casing about 15 inches in diameter. In constructing the well the perforated sections should be put in place, one above another, to within about 10

feet of the water level; from this depth upward the casing should not be perforated.

AMOUNT OF WATER THAT CAN BE OBTAINED FROM THE WELLS.

Wells constructed as above, in gravels similar to those in the South Platte and Arkansas valleys, will furnish at least $\frac{1}{4}$ gallon of water per minute for each square foot of strainer surface in the well, when the water in the well is lowered 1 foot by pumping. If the water in the well is lowered 10 feet by pumping, the amount of water recovered should amount to at least ten times as much, or $2\frac{1}{2}$ gallons per minute per square foot of strainer. If a 15-inch well is drilled in good water bearing gravel to a depth of 40 feet, the lower 30 feet of which is strainer surface, and if the pump lowers the water in the well 10 feet, the amount of water supplied by the well should amount to at least 300 gallons per minute. A careful test of the water works at North Platte, Nebr., showed that the strainers in the wells were furnishing 3-10 gallon of water per minute per square foot of strainer surface, when the water in the wells was lowered 1 foot by pumping. The average of eleven pumping plants in the Arkansas valley has 0.33 gallon of water per minute for each square foot of strainer surface under one foot head.

For small pumping plants a single well of the depth indicated above would probably be sufficient, but if good water bearing gravels do not extend to the requisite depth, it would be necessary to increase the number of wells and connect several of them to the pump.

arrangement of the wells. Two different methods will be found available for this purpose. If the amount of water required is not greatly in excess of that which can be supplied by a single tubular well it is often found practicable to construct a large dug well, 6 to 10 feet in diameter, to a



Fig. 1—Well strainers made of slotted galvanized iron. These strainers are 15 inches in diameter, and ten feet long, provided with 3-16 by 1 1-4 inch hit and miss slots, punched before the steel is galvanized. The strainers shown in the diagram were made of No. 18 wire gage sheet steel.

DISTANCE BETWEEN WELLS.

If it is necessary to construct several wells in order to secure the amount of water required for an irrigation plant, it becomes important to consider the best and most economical

depth of 5 to 10 feet below the water level, inserting in the bottom of the dug well several feeders of perforated galvanized iron, as described above. This method has the advantage of permitting the pump that is to recover the

water to be submerged in the water of the well. A well of this sort is shown in Fig. 2.

In order to sink a dug well the proper distance below the water level it is necessary to construct a wooden, brick, or concrete crib that will sink as the material is removed from its interior. The crib of the well shown in Fig. 2 is made of wood, and is made larger at the lower than at the upper end to facilitate sinking.

Another method of recovering a large quantity of water is to sink a battery of wells and connect them by suction pipe to the pump. This method is adapted to secure a larger supply than the method just mentioned. Three or four, or more wells can be arranged in a straight line, 20 to 30 feet apart, and connected to a pump placed near the center of the row of wells. In the diagram (Fig. 3) will be found an arrangement suitable for a battery of eight to twelve wells. These wells are arranged in pairs, close together, each pair of wells being 40 to 60 feet from the next pair on the same suction line. The object of placing the wells close together in pairs is for the purpose of removing a large amount of the fine sand from the water-bearing gravel. This can be done in gravels like those found in the Western valleys by pumping vigorously from one of the pair of wells, and at the same time running clear water into the neighboring well. By this means it should be possible to clear out all the fine material between the two wells. If the water-bearing gravels are of the kind usually found in the river valleys of the Western prairies, a pumping plant can be constructed sufficiently large to supply from 2,500 to 3,500 gallons of water per minute without lowering the water more than 10 feet. Pumping plants of greater capacity than this will usually not be profitable. A large number of moderate sized plants is more desirable than a few large ones.

KIND OF PUMP.

Probably the most satisfactory pump for use in irrigation is the cen-

trifugal pump. However, there are many kinds of small centrifugal pumps. It does not pay to purchase any but the very best machinery for the pumping of water, as poorly designed machinery soon proves too expensive. The various kinds of pumps differ greatly in this respect. The centrifugal pump used by the irrigator should be of the *enclosed runner* type, provided with self-oiling bearings of the oil ring type. There are several excellent makes of centrifugal pumps on the market, and any of them will do good work if the size and design of the pump fit the conditions under which it must work. The maker of the pump should have full information of all the conditions under which the pump is to be installed. These conditions should include the distance that the pump must discharge the water above its outlet; also the amount of suction or the distance the water must be lifted below the pump inlet. The following points are important to those about to install pumping plants:

1. The efficiency of the centrifugal pump under actual working conditions is higher for the large size pumps than for the small size. Pumps having less than 3 inches diameter discharge pipe will show a low efficiency.

2. A centrifugal pump will work better and be more efficient if the suction pipe is as short as possible, relative to the length of the discharge pipe. On this account the pump should be placed as near the level of the water as the securing of a good foundation will permit.

3. If the pump is to be driven by means of a belt, it should be provided with a large pulley. The pulley usually supplied with the pumps is so small that a great amount of slipping takes place between the belt and the pulley, and the efficiency of the pump is greatly decreased. Of course it is necessary to secure the proper proportion between the size of driving and driven pulleys, but both should be larger than are usually furnished with pumps and engines.

4. The suction pipe on the pump and the discharge pipe should be large.

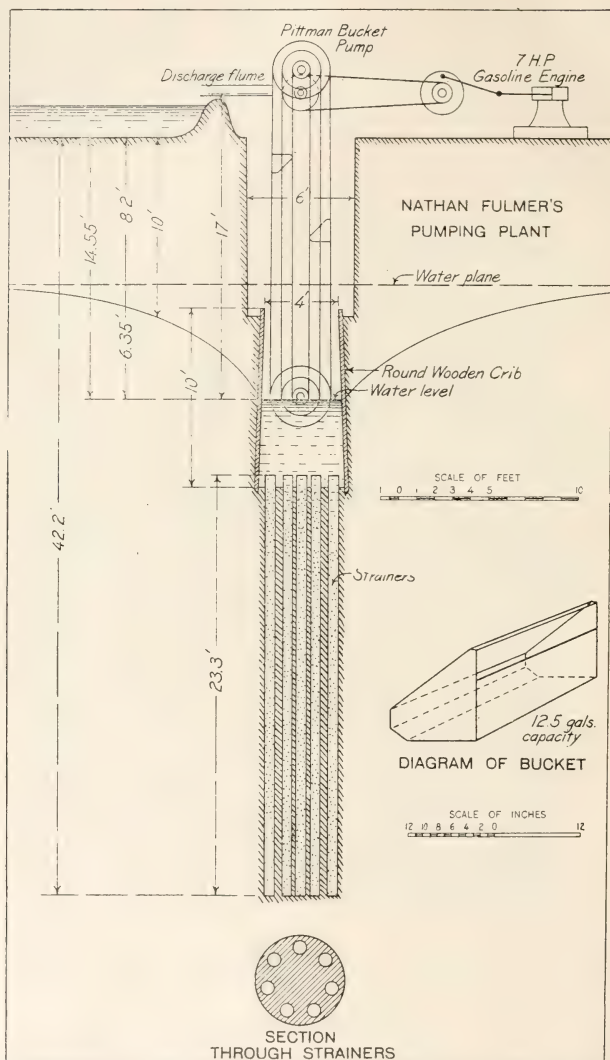


Fig. 2—Diagram of a pumping plant in the Arkansas Valley in which the water is recovered from a dug well having a wooden crib, in the bottom of which are placed seven galvanized iron strainers or feeders. A chain and bucket pump is used on this well. Better results would undoubtedly be obtained by using a vertical shaft centrifugal pump submerged in the open well.

A No. 4 centrifugal pump that draws water from a single well should have at least a 6-inch suction pipe, and the discharge pipe should gradually increase from 4 inches at the discharge opening of the pump to 8 inches 3 feet above the discharge opening, and continue this size until the flume or discharge conduit is reached. The discharge pipe can be made of riveted galvanized iron, and the suction pipe can be made either of standard pipe or good well casing.

5. A centrifugal pump loses its efficiency at once if there is an air leak

shown an efficiency of about 80 per cent.

METHOD OF PRIMING PUMPS.

A large number of pumping plants are installed with foot valves at the bottom of the suction pipe. When these are provided, a centrifugal pump is always ready to start after it is once primed. The foot valves usually interfere very materially with the flow of water into the pipe, and it is undoubtedly more economical to omit them and place a flap valve at the upper end of the discharge pipe which can be



Fig. 4—Measuring weir at pumping plant near Garden City, Kansas. At the time the photograph was taken the pumping plant was yielding 200 gallons of water per minute

around the stuffing box, or at any place in the suction pipe. Many centrifugal pumps are now provided with a water seal around the stuffing gland that insures the absence of leaks at this point.

A good centrifugal pump with enclosed runner should show an efficiency of about 60 per cent. on a 30-foot lift. Single stage centrifugal pumps constructed with bronze runner made in two parts so that the interior could be machined and smoothed have

lowered when it is desired to start the pump. An ordinary cast-iron house pump connected to the top of the casing of the centrifugal pump can be used to prime the pump with water before starting.

PIPE FITTINGS.

The suction pipe installed by those who construct pumping plants is not only usually too small for the best results, but the elbows and tees used are ordinarily very poorly adapted to

the purpose intended. It is a common practice to use steam pipe fittings for this purpose. In consequence the water is required to turn at sharp angles at the tees and elbows, and the best results cannot be attained. In order to avoid this difficulty "long sweep" fittings should be purchased. These are standard trade goods and can be obtained from any of the large dealers in pipe fittings.

SOURCE OF POWER.

A popular source of power for small pumping plants is the gasoline engine. Where the price of gasoline is high, it is very easy to make the cost of water prohibitive by the use of such power. Whether or not it pays to pump water by gasoline is a matter which depends very largely upon the distance the water must be lifted, but also upon the kind of crop that is to be irrigated. Gasoline, even at a high price, is usually a cheaper fuel than coal in an ordinary steam engine of small horse power, such as a common traction engine. For plants requiring from twenty to thirty horse power, producer gas generators can be installed which will keep the cost of pumping down to a minimum. A suction gas producer, using anthracite pea coal for fuel, should furnish power at the rate of one horse power per hour for each pound and a half of coal consumed. At \$8.00 per ton, the cost of coal should be equivalent to gasoline at four to six cents per gallon.

In large plants, requiring from fifty to one hundred horse power, or more, a condensing Corliss engine is sufficiently economical where the cost of coal does not exceed \$3.50 to \$4.00 per ton.

ECONOMICAL HEIGHT WATER MAY BE LIFTED.

It is very unlikely that it will pay to pump water, under present conditions in the valleys of the western States, to a total height of more than 30 feet, including the suction lift of the pump. If the pump lowers the water in the wells 10 feet; and if the distance to

water be 10 feet below the ground, and the discharge pipe be brought into a reservoir or flume 5 feet above the surface of the ground, the total lift will be 30 feet. If 5 feet be added to cover loss of head due to friction in suction and discharge pipe.

DESIRABLE RESERVOIR.

In order to irrigate economically from pumping plants it is usually desirable to pump the water into a reservoir having a capacity equal to the amount of water the plant can furnish in 6 to 8 hours. Such a reservoir is absolutely necessary for best results with small pumping plants. If the supply of water exceeds ten gallons per minute it is possible to dispense with the reservoir, especially if the supply greatly exceeds the amount. Plants furnishing over 100 gallons per minute can usually be best operated without the use of a reservoir.

COST OF PUMPING.

The cost of recovering ground water from wells is made up of four principal items: (1) fuel and supplies; (2) labor; (3) depreciation and repairs; (4) interest on the first cost of the plant, or on the capital invested. The first and third of these items are partially under the control of the owner of the plant. If the installation is carefully designed and its parts well proportioned, the cost of fuel can be kept at a minimum; and similarly, the charge for depreciation and repairs will be kept low if good machinery be purchased in the first place, and careful attention be given to its maintenance when in operation and when idle. The charge for depreciation will be as great, if not greater, when the plant is not running as when running. The rate of depreciation when idle will greatly exceed the rate when running. If the machinery is neglected and carelessly exposed. The charge for depreciation and repairs should not be estimated at less than 10 per cent on the first cost of the plant.

APPROXIMATE COST OF FUEL REQUIRED TO PUMP 1,000 GALLONS OF WATER PER MINUTE, FOR VARIOUS LIFTS:

Total lift.	Engine horse power required	Cost per hour of fuel, gasoline 16 cents per gallon.	Cost per hour of fuel, gasoline 20 cents per gallon.	Cost per hour for coal at \$8.00 per ton in suction gas producer plant.	Cost per hour for coal at \$4.00 per ton in condensing steam engine.	Cost of depreciation and repairs on machinery, etc., per year.
Feet		Cents	Cents	Cents	Cents	Dollars
10	16	11.2	14	4.2	6	70
20	11	22.4	28	8.4	12	140
30	16	33.6	42	12.6	18	210

NOTE.—1,000 gallons of water per minute pumped continuously for eleven hours is equivalent to two acre feet of water.

The accompanying table gives an estimate of approximate cost for fuel and maintenance of a pumping plant having a capacity of 1,000 gallons of water per minute for total lifts of ten, twenty and thirty feet.

In order to determine approximately the cost of pumping water any distance between twenty and thirty feet, a proportional part of the cost for ten feet can be added to the cost for twenty feet. Thus, to get the cost of pumping water a distance of 25 feet, half the numbers in the first line of the table can be added to those in the second line. The table should only be used for estimating the cost of pumping water for lifts lying between twenty and thirty feet. The cost for ten feet is given for the purpose of making estimates, but it should not be supposed that the cost for this low lift would be merely half of that for the twenty foot lift, as friction losses and others would tend to make the cost for the low lift higher than that stated in the table.

FIRST COST OF PUMPING PLANTS.

At almost any point in the river valleys of the western plains complete pumping plants, including wells, machinery and buildings, can be constructed for about \$100 per horse power required. In some exceptional cases the cost may run as low as \$60 per horse power.

The pumping plant of Mrs. M. Richter, near Garden City, Kan., uses

a Menge pump which is run by a 10-horse power Otto gasoline engine. The area of the strainer and the bottom of the well is 266.5 square feet. The specific capacity per foot of percolating surface is .341 gallons per minute. The cost of operation with gasoline at 20 cents per gallon amounted to 21 cents per hour, .89 cents per thousand gallons, \$2.90 per acre foot, and 1-17 cents per thousand foot-gallons.

The pumping plant of Nathan Fulmer, near Lakin, Kan., utilizes a chain and bucket pump. The power is supplied by a Howe gasoline engine which develops about 7 horse power at 285 revolutions per minute. The cost of gasoline at 21 cents per gallon and the expense of running the engine was 13.65 cents per hour. The cost of water was \$1.37 per acre-foot, .22 cents per thousand gallons, and 1-40 cents per thousand foot-gallons.

The pumping outfit of J. H. Logan near Garden City, Kan., consists of a 6-horse power horizontal gasoline engine connected by a belt to a No. 3 centrifugal pump. The specific capacity of the well is 422 gallons per minute, or 3.94 gallons for each square foot of well strainer. The fuel cost of pumping was .9 cents per thousand gallons, \$2.93 per acre-foot, or 1-25 cents per thousand foot-gallons.

The cost of pumping at 12 plants in the Arkansas Valley in Western Kansas ranged from \$0.85 to \$3.75 acre-foot.

FOREST LEGISLATION BEFORE THE 59th CONGRESS—FIRST SESSION

THE following Acts, which bear more or less directly upon forest reserve interests, were passed at the last session of Congress:

Act of March 15, 1906, permitting agricultural settlement in a certain restricted portion of the Yellowstone Forest Reserve.

Act of March 16, 1906, to provide for an annual increase in the appropriation for agricultural experiment stations until the total for each State and Territory shall be \$30,000. Such stations as desire to do so can turn part of this added income toward experiments in forestry.

Act of May 1, 1906, to grant the Edison Electric Company a permit to occupy land in the San Bernardino, Sierra, and San Gabriel Forest Reserves for electric power plants. This law was drawn in cooperation with the Forest Service, which approved it as an entering wedge for a uniform law with regard to rights of way and privileges upon all land owned by the United States. Its salient features are:

(1) That it grants an easement to the permittee, thus making his tenure certain for some definite length of time.

(2) That the Secretary may fix the duration of the permit to suit the needs and the magnitude of the project involved in the permit.

(3) That construction work must be completed within a definite time and the privilege enjoyed beneficially for a reasonable time each year.

(4) That the Secretary may exact from the permittee such reasonable annual rental charge as he deems proper, changing it from year to year as circumstances seem to warrant.

Act of June 4, 1906, to punish the cutting, chipping, or boxing of trees on the public lands. This law was passed to prevent the practice of going upon the public domain and destroy-

ing resin-bearing trees by conducting turpentine operations. The Commissioner of the General Land Office has already agreed to investigate turpentine in Florida and bring action against trespassers on the public land.

Act of June 8, 1906, to preserve American antiquities. This Act provides that the Secretaries of the Interior, of War, and of Agriculture may join together to make such rules and regulations for excavation and study of historic or prehistoric ruins or monuments or other objects of antiquity upon the public land under their respective jurisdictions, as they may deem necessary to protect these antiquities.

Act of June 11, 1906, to provide for the entry of agricultural lands within forest reserves. (Described fully in FORESTRY AND IRRIGATION for June, 1906.) This law makes it possible for the Secretary of Agriculture to list for entry under the homestead laws, such tracts of agricultural land as he may find within forest reserves. It should do much to allay criticism of the National forest policy and at the same time bring within the reserves a desirable class of inhabitants available for protection against forest fires and timber depredations.

Act of June 11, 1906, to accept the recession by the State of California of the Yosemite Valley and Mariposa Big Tree Grove. This law brings these important parks again under the control of the United States Government, and incidentally modifies, to a slight extent, the boundary of the Yosemite National Park. The change will probably be advantageous, since the State of California had not appropriated the money necessary to care for the Yosemite Valley.

Act of June 27, 1906, to grant lands to the State of Wisconsin for State forest reserve purposes. By means of

this law the Wisconsin forest reserves will be helped to a considerable extent.

Act of June 29, 1906, to permit the President to designate such areas in the Grand Canyon Forest Reserve as should, in his opinion, be set aside for the protection of game animals. Owning to a horseshoe bend of the canyon there is a certain portion of that forest reserve which, by building a short fence, can be completely cut off from the surrounding country. This will furnish an unusually secure breeding place for the native game animals and those which different societies may wish to import.

Act of June 29, 1906, to create the Mesa Verde National Park.

Act of June 30, 1906, (Agricultural Appropriation Act). This law provides as follows:

(1) That the forest reserve special fund, which would otherwise cease to be available for the administration and protection of forest reserves in 1910, shall continue available until Congress takes action to provide otherwise.

(2) That ten per cent. of all money received from each forest reserve during any fiscal year, including the one just passed, shall be paid to the counties in which the reserve is situated for the benefit of the public schools and roads. Over \$75,000 will be available for such counties at once, and the amount will increase rapidly from year to year.

(3) Permission to export forest reserve timber from the State or Territory in which it was cut is extended to cover all States and Territories and the District of Alaska, with the sole exception of the Black Hills Forest Reserve in South Dakota, where dead and insect-infested timber only may be exported.

(4) A special appropriation of \$15,000 was made for building a wire fence and necessary sheds in the Wichita Forest Reserve to provide a range for a buffalo herd which is to be presented by the New York Zoological Society. An area has been selected for this enclosure, and the conditions of

climate and forage are such that the buffalo herd will probably increase and last for all time.

Act of June 30, 1906, to authorize rights of way for the City of Los Angeles, Cal., through the Sierra, Santa Barbara and San Gabriel Forest Reserves for a sufficient water supply to meet all possible increase in the population of that city. The city is allowed in the meantime to use the surplus water for generating electricity and for irrigation purposes.

The principal bills, which were of interest but did not pass, are as follows:

The Appalachian and White Mountains Forest Reserve Bill passed the Senate and was reported as a Committee measure in the House. In the latter place, however, it was never called up for consideration. There seems to be considerable likelihood of its passage next year.

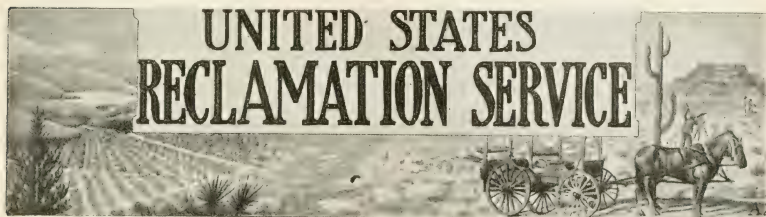
Senator Burkett's Grazing Bill was introduced in both Houses, but failed to receive any consideration owing to the pressure of such important measures as the Rate Bill, etc. The stock-growers, however, have shown great interest, and many meetings of their associations have declared in favor of Government control. It looks very likely that this bill will be actively considered next year with a fair chance of becoming a law. The condition in the West on account of overgrazing, the insistent advent of new stockmen, and the conflict between sheep and cattle interests, is becoming too dangerously acute to be ignored. In a few years some irreparable damage to the forage-producing power of the range will have been done, and stockmen will be practically in a condition of civil warfare.

The Tawney Bill, for more definitely fixing the boundaries of the Minnesota National Forest Reserve and reimbursing the Indians for their land taken for public purposes, seemed to fail of passage merely because it was not taken up in Committee early enough in the year.

The General License Bill, spoken of above in connection with the Edison Electric Company's right of way, was not even introduced this winter, but will be a prominent factor at the next session.

A bill proposing to transfer the Na-

tional Parks to the care of the Secretary of Agriculture, in order that they may be administered from a forest standpoint, received very little attention, and no prediction can be made concerning its treatment in the future.



Progress of Government Irrigation Work During Past Month

Important Decision

The Assistant Attorney General has just rendered an important decision on the following questions:

First. Whether one who has made a homestead entry, not exceeding the farm unit limit, either under the provisions of the Reclamation Act or under the general law, may obtain water for such tract and also for one or more other tracts of which he is the proprietor, provided the area held in private ownership does not exceed the private ownership limit fixed by the Secretary of the Interior.

Second. If the homestead entry was made prior to the Reclamation Act withdrawal and contains an irrigable area in excess of the farm unit limit, whether, for the purposes under consideration, the excess area is to be regarded as of the same status as land in private ownership.

The case in point is on the Minidoka project, Idaho, where certain state lands fall within the irrigable area. The lands under this project have been classified and the farm unit fixed at 80 acres. The question arose as to whether a person who makes a homestead entry of 80 acres under the Minidoka project and also purchases

80 acres of state land may secure water from the Government works for the irrigation of both tracts. The point submitted involves a broad question applicable to all of the reclamation projects. The Assistant Attorney General holds that

"A person who has made or may make homestead entry of lands withdrawn for disposal under the act of June 17, 1902 (52 Stat. 288) and subject to the provisions, limitations and conditions of said act, may obtain water for such tract and may also obtain water for one or more tracts of which he is the proprietor, not exceeding the limit of area fixed by the statute, authorizing the use of water for land in private ownership, or as fixed by the Secretary of the Interior.

"If the entry was made prior to the withdrawal under the Reclamation Act, the entryman may be entitled to the right to the use of water for the irrigable area of the land entered, and also for such area of lands held by him in private ownership which added to the irrigable area of his entry will not exceed 160 acres.

"While there appears to be no restriction in the act upon the right of a homesteader to the use of water for

land owned by him to the extent of area allowed to any one landowner, it has been deemed advisable to administer the law through the instrumentality of water users' associations which are organized by the owners of lands within the project. By the contracts heretofore made with such associations by the Secretary of the Interior, only those who are or may become members of such associations will be accepted as entrymen or applicants for the right to the use of water which may be impounded or controlled by the works of such project.

"Under the articles of incorporation and by the laws of such associations, which are part of every contract, every member or shareholder of the association, whether he be the owner of lands or an entryman of public lands, is restricted in his holding to 150 shares of stock, one share being allowed to each acre or fraction thereof, so that, the Secretary of the Interior, by entering into a contract with such association, has fixed 160 acres as the limit of the right to the use of water by any one person, whether the land irrigated is entered as public land or is held in private ownership, or under both rights."

Chance for Cement Making

An investigation was recently made by the cement experts of the United States Reclamation Service to determine the existence and availability of raw materials for the manufacture of Portland cement in the vicinity of Havre, Mont.

An area exceeding 355 acres convenient to Assiniboine station, on the main line of the Montana Central Railway, Great Northern system, was found to contain an unfailing supply of natural cement rock. Suitable clay for an admixture, if needed at any time in the preparation of cement, is abundant on the ground, and the bituminous coal mines throughout the section furnish fuel adapted for the burning of the rock. A mill site and town site were located and large springs furnish an abundant water

supply for domestic and other purposes.

The Reclamation Service has four large projects in Montana which have been approved by the Secretary of the Interior. Upon two of these work is well under way. The estimated cost of these four great works is \$12,000,000, and upon their completion depends the reclamation of approximately half a million acres of land. Thousands of barrels of cement will be needed in their construction, and the service is naturally gravely concerned in the output of this material, as the present unprecedented demand for cement all over the West is already taxing the capacity of mills throughout the country to the utmost. It is believed that investors will embrace the opportunity presented by the known existence of materials suitable for cement manufacture in various localities in the West. The great profits arising from the successful conduct of the cement business is now too well known to require comment.

It is not the policy of the Government to go into the cement business unless through the inaccessibility of the works the success of a project should become jeopardized, as in the case of the Salt River project, Arizona, where the great distance from existing mills and the long wagon haul made the cost of cement prohibitive.

Gaging Stations Washed Out

The recent floods on Walla Walla and Umatilla Rivers carried away several gages of the United States Geological Survey, and at one station (Milton) washed away the whole station outfit, including the cable from which discharge measurements were made. At another station at Milton, on the South Fork of Walla Walla River, a new channel was formed, leaving the bridge and gage high and dry. Estimates of discharge during this flood have not yet been made for most stations. A discharge measurement made at the crest of the flood in the lower stretch of Umatilla River

shows the exceptional rate of eight second-feet per square mile for the drainage area of 2,270 square miles, or a maximum flow of more than 18,000 second-feet. Gaging stations on these rivers were of value to irrigation interests, those on Umatilla River having been utilized by the Reclamation Service in the consideration of the Umatilla project.

Payette-Boise Project

In order to preserve the priority of water right and thus render possible the completion of the work on the Payette-Boise irrigation project, in Idaho, the Secretary of the Interior has declared that an extraordinary emergency exists, under the provisions of the eight-hour act of August 1, 1892.

According to the laws of the State of Idaho, before performing any work in connection with the construction of projects involving the appropriation of water, it is necessary to file an application with the State Engineer for a permit to make such appropriation. This application must state the time required for the completion of construction of the proposed works, and the law requires that one-fifth of the work must be completed in one-half the time required for the completion of the entire project.

In order that the required amount of work on the Payette-Boise project may be completed within the time specified, it has been found necessary to rush the work of construction, which has been delayed by difficulty in obtaining early delivery of machinery and in securing laborers. It was also found upon opening bids for the construction work that a portion of the system must be done by force account, and the necessity of re-advertising for bids caused much further delay.

Rapid Work in New Mexico

There was a surprised lot of farmers in the neighborhood of Malaga, New Mexico, a short time ago, when the Reclamation Service engineers turned the water into the Black

River canal under the Carlsbad project.

The work on the project has been pushed rapidly in order to serve as large an acreage as possible during the season. The Black River canal was completed in May, including about 4,000 feet of concrete lining and a full head of water is being delivered to the farms in the vicinity of Malaga. The work was finished in double quick time, and the farmers got the water before they expected it, and a larger quantity than they counted upon; consequently, they did not prepare and plant all of the land that could have been cultivated. The old ditch leaked out three-fourths of the water it diverted, but this fault is not found in the new canal. The Black River ditch diverts directly from Black River, a tributary entering the right bank of the Pecos River about 18 miles below Carlsbad.

The earthwork on the first three miles of the main canal of the Carlsbad project is practically completed, and another force is busy tearing out the old spillway at Dark Canyon, removing the present bank and making excavation for the seven-foot concrete pipe, and building new embankments. The large store house at Avalon dam has been completed, and the stone crusher is in place and nearly ready for operation. The bridge has been repaired and excavation has been begun for the core wall of the dam at the east end near the canal heading. Tools and machinery are arriving every day, and the force is being enlarged and organized for rapid and effective work.

Cooperative Work in South Dakota

The President has issued an order reserving the NE. $\frac{1}{4}$ of Sec. 24, T. 9 N., R. 5 E., Black Hills Meridian, South Dakota, within the limits of the Belle Fourche irrigation project, for the purpose of experimental work in agriculture, under the supervision of the Department of Agriculture, the tract, however, to remain under the general jurisdiction and control of the Reclamation Service.

**Joint
Conference**

The Secretary of the Interior has called a conference to be held at Portland, Ore., or Seattle, Wash., this month between the engineers of the Reclamation Service and Chief Engineer Code, of the Indian Irrigation Service, and Mr. J. Lynch, superintendent of the Yakima Indian agency, to consider matters with reference to the reclamation of the lands in the Yakima Indian reservation in connection with the Yakima project.

**Rio Grande
Project**

The Secretary of the Interior has executed a contract with the Elephant Butte Water Users' Association and the El Paso Valley Water Users' Association to secure to the United States the cost of constructing the Leasburg diversion dam and canal, Rio Grande irrigation project, New Mexico.

**Gunnison
Tunnel
Work**

The Reclamation Service engineers are justly proud of the progress being made on the Gunnison Tunnel in Colorado, which is being constructed by force account. The first mile, or one-sixth of the tunnel was completed on November 17, 1906. The first of the present month 13,767 feet had been excavated, 1,321 feet having been completed during the month of June. Night and day unceasingly the drills are breaking their way through the granite wall and the world's record in tunnel excavation has been established on the work.

**Lippincott
Resigns**

Mr. J. B. Lippincott, consulting and supervising engineer in charge of work in California, has resigned his position with the United States Reclamation Service.

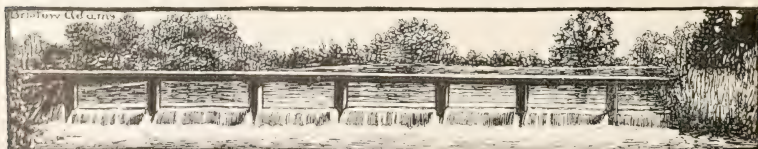
Mr. Lippincott, who is a graduate of Dickinson College, Pennsylvania, and the University of Kansas, has been engaged in civil engineering since 1886. For several years he was prominently connected with irrigation work in California in private capacity, and since 1895 has had charge of the hydrographic investigations for the United States Geological Survey in that state. He is one of the oldest engineers in point of service in the Reclamation Bureau, and the resignation of so able and energetic an assistant is greatly regretted by the officials of the department.

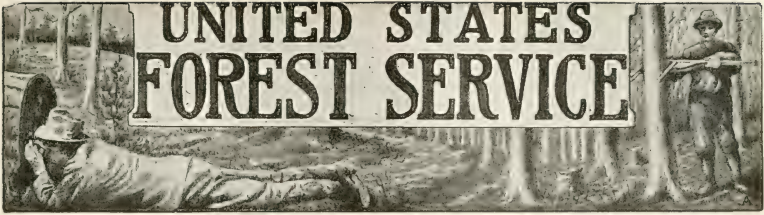
There is an increasing demand throughout the country for the services of first-class engineers, and owing to the limited salaries offered by the Reclamation Service the Government is losing many men of experience and ability.

**Force work
on Klamath
Project**

The Secretary of the Interior has granted authority to the Reclamation Service to prosecute the work incident to the construction of nineteen miles of canal and twenty-seven miles of laterals, with appurtenances, in connection with the Klamath project, California-Oregon, by force account, and to employ the force required to carry the work vigorously to completion in order that this distributing system may be ready for use when the main canal, now under construction, is completed.

The board of consulting engineers recently convened at Klamath Falls to open bids for this work reported that no bids were received. The time required to readvertise this work, it is believed, would so delay construction that it is improbable water could be provided for irrigation by next season.





Forestry Sand Hills

Reclaiming the barren sand hills of the Middle West with forest cover,

to supply timber when there is a dearth of it, is one of the more striking of the important forest planting projects of the Forest Service. Four of the national forests have been established in the non-agricultural region with the express purpose of getting a firm grip on methods which will overcome natural difficulties and set up object lessons for the benefit of the people. These are the Niobrara, the Dismal River, and the North Platte reserves in Nebraska and the Garden City reserve in Kansas. The Nebraska reserves have responded so well to careful treatment that hundreds of thousands of seedlings have been planted out and millions more are being raised in nurseries for use in other reserves. Thus, for the first planting on the Garden City reserve, just completed, most of the trees were taken from the nurseries in the Dismal River reserve.

The Kansas reserve lies in a region of scattered, barren sand hills, interlaced with prairie on which grass thrives well enough to support live stock. The origin of these hills, in itself interesting, reminds one in a way of that of the sand dunes which encroached from the sea upon the fertile fields of western France and laid them waste. In both cases the wind has been the enemy of the soil, for in France wind drove the sand of the seashore inland, and in the middle western region of our own country wind drove eastward the sand which the Arkansas River had carried down in floods and

afterwards exposed to dry. The sand hills were formed long ago, and the action of the wind is now largely checked by the spread of the carpet of grass, which binds the sand wherever there is enough moisture to encourage it.

The semiarid conditions of the region necessarily restrict the selection of trees. Right choice of species, the crux of forest planting generally, is here especially decisive. By its aid, together with right planting methods and right care of the plantation, a treeless region, one therefore in which wood is a scarce and a highly valuable commodity, can be made to produce useful woods, and at a cost so slight as to satisfy good business judgment. Thus on a light, sandy surface, where only cover is wild grass and weeds, a merchantable forest crop is to be grown. In addition to the general demand for wood, there will be a special demand in connection with the Garden City irrigation project, which is within a few miles of the Garden City Reserve.

Honey locust, Osage orange, Russian mulberry, red cedar, and western yellow pine are the trees used in the new project, of which 51,000 came from the Government nursery, near Halsey, Nebr. The planting this season progressed under highly favorable conditions as regards weather and the physical condition of the soil, and at the expiration of six and one-half days thirteen men had completed the task at a total cost, exclusive of the trees, of \$3.88 per acre.

A fence was built about the three-fourths of a section in which the plant-

ing was done, though part of this area remains to be planted next season. This was to exclude stock. To exclude prairie fires a fire guard was ploughed about the plantation.

Kiln Drying Tupelo

The Forest Service has made a successful demonstration of kiln-drying tupelo, the experiment being undertaken in coöperation with a lumber manufacturer in Louisiana, who deals in tupelo, and with a wagon manufacturer in Michigan. The lumber was cut in the former state and shipped directly to the latter, where it was put through the dry-kiln without preliminary seasoning. Tupelo is a wood suited to many commercial uses, and one to be profitably lumbered in connection with cypress, with which timber it occurs. A drawback to the use of tupelo has been the difficulty of seasoning, since it is subject to warping, checking, and staining in the seasoning process. Hence a demonstration of success in kiln-drying the wood without any of these defects is of great value to the tupelo industry.

In the experiments the kiln used is that known as the blower type, operated on the moist-air principle of drying. The hot air is forced by fans into the dry end, thence passes back through the trucks of lumber to the wet end, and is returned to the engine room through a large drying chamber over the kiln itself. The whole structure is as nearly air-tight as it can be made; consequently the same air, passing through the kiln and back over the steam-heating coils, is used over and over again. The necessary moisture is obtained from the green lumber as it is put into the wet end of the kiln.

The lumber should enter a temperature of about 93 degrees Fahrenheit at the wet end of the kiln. The temperature gradually increases as the truck moves toward the dry end, where it should stand in a temperature of 140 degrees to 150 degrees Fahrenheit for two or three days. In the experiment described the average

temperature of the wet and dry ends was respectively 98 degrees and 133 degrees Fahrenheit. In this particular case the relative humidity at wet and dry ends was 84 per cent and 29 per cent, respectively.

As has been demonstrated in air-drying, so in kiln-drying, the correct piling of lumber is of utmost importance. The piles on the trucks should be arranged so that the spaces between the boards are not obstructed by adjacent courses, but remain open so as to give an upward vent to aid the circulation of the drying air. This can be accomplished by piling the wide boards apart from the narrow ones, or by laying the wide boards so that they do not extend over the open spaces. The old method of piling narrow and wide boards together so as to get horizontal and criss-cross circulation, is satisfactory in the open air where there are strong winds; but in a kiln, with only a few inches of space about the stack for air circulation, the lumber must be piled as openly as economical operation of the kiln will allow.

The boards in this experiment were from eight to twelve inches wide, one inch thick, and fourteen feet long. One truck was piled with the cross strips twelve inches apart, and another with strips eighteen inches apart. Equally good results were obtained by both methods. The lumber was in the kiln fifteen days, and when taken out was dried satisfactory without molding, staining, or stick-rotting. Only one board was checked as much as one foot from the end, and none of the other boards showed checks more than half an inch in length at the ends, while most were not checked at all. Five of the boards on the top course were slightly warped. There was a loss of 4,200 pounds, or one-third of the green weight, and a shrinkage of 127.2 board feet or 4.4 per cent of the original scale.

The method here described is that regularly used at this kiln in the drying of red gum, which occupied other trucks at the same time. Thus it was

shown that the tupelo can be kiln-dried by the same methods that are used for the red gum, and with equal success.

There is now in preparation Forest Service Circular 40, a comprehensive treatment of the "Utilization of Tupelo," which will soon be ready for distribution.

**Use of
Fire-Killed
Timber**

Although it has been known for a number of years that fire-killed timber has a considerable value in railroad and mining operations in Colorado, it has been brought out only recently by the Forest Service that a wide number of uses are open for this timber, and that in certain respects it has actual advantages over green wood.

These facts are deduced from a study of conditions on the Pikes Peak Forest Reserve, where the ravages of fire have been particularly widespread and destructive. In many instances the burned timber is the only kind available at a particular point, for example, in proximity to a mine or a spur of railroad, so for timbers and ties the dead material has been used for many years—fifteen years at Palmer Lake, seven years at Florissant for railroad ties, and longer than this for mine timbers. Three years ago it was first used for box boards and has proved excellent. In May, 1905, there was a sale for telephone poles.

The species used are red fir, yellow pine, lodge-pole pine, limber pine, range pine, pinion, Engelmann spruce, and blue spruce. Of these, the pines, red fir, and Engelmann spruce, furnish the bulk of the material. Time elapsed since burning seems to make no great difference in the value of the wood, except that when serious checking results it loses its value for box purposes. The timber used has been burned all the way from three to fifty-five years.

The amount of this timber which has been used is very considerable. There has been one sale from the reserve for box boards and one for telephone poles, but the three main uses continue to be mine timbers, railroad

ties, and firewood.

Red fir is preferred for railroad ties, then yellow pine, limber pine, and range pine. White pine has been objected to because of its lack of durability, but it is now taken in many places. At Rosemont, Colo., burned timber of all kinds is made into ties, some of the material having been burned fifty year ago. It is asserted that dry ties last as long and in many cases longer than green ties. On the Cripple Creek "short line" they were more satisfactory than green pine ties from Texas. Dry ties hold a spike well and a tie plate does not cut into the wood so seriously as it does in the case of a green tie. Englemann spruce is as good as other species as far as mechanical wear is concerned, but it decays much quicker and so should be given a preservative treatment.

Burned timber was first used for boxes by the Denver Crate and Box Company in February, 1903, the species used being Engelmann spruce and lodgepole pine, with some red fir and limber pine. The material used had been burned one one-half to four years. The Engelmann spruce was excellent, and the lodgepole pine also gave good results. The fire seasoning had driven the odor out of the pine so that it could be used for packing crackers and biscuits. Also, on account of the perfect seasoning the boxes remained tight when put up and therefore sold better than green boxes.

For mine timbers all species are used, if of the requisite size. Dry timber is preferred because of its lightness, durability, and stiffness, all principally due to its better seasoning.

For many purposes fire-killed timber should be preferred to green timber because it is so well seasoned. This seasoning makes it more durable than green timber, and also makes it lighter, so that its cost of transportation is appreciably less, and it is therefore available, not only for numerous local uses, but for shipping long distances. Actual experience with the fire-killed timber proves that its utilization should be a source of profit to the reserve.

WHITE ELM (*Ulmus Americana*)*

VIII.—Notes on Forest Trees Suitable for Planting in the United States

DISTRIBUTION AND MANNER OF OCCURRENCE.

THE White or American Elm has been distributed through natural agencies from southern Newfoundland westward along the northern shores of Lake Superior to the eastern base of the Rockies, and through the United States to the Black Hills, western Nebraska, Indian Territory, and Texas; southward it grows as far as Florida. It is infrequent in the extreme western and southern portions of its range, but appears in greatest abundance in the Northeast, especially in New England, where trees of remarkable size and beauty are found. The highest development is attained in the rich alluvium of the Connecticut River Valley.

Although seldom the most numerous species in a forest stand, the White Elm is widely and uniformly distributed in the East and is one of the most common trees. Its favorite place of growth is in rich intervals, or on fertile wooded slopes where moisture is constant and abundant. It will grow, however, in almost any soil, hence it may be found in nearly every open field, or woodlot, and along roadsides everywhere throughout the East. In the Middle West it is one of the most common species, but is more closely confined to river valleys than farther east.

The range advised for economic planting comprises all of the middle Western States, as far south as northern Texas. For purposes of shade and ornament, planting may be done throughout the entire range of the tree.

CHARACTERISTICS OF GROWTH—ASSOCIATE SPECIES.

The divided trunk and spreading vase, or broom-shaped crown, of trees

grown in the open is well known. When grown in the forest the trunk remains a single stem and the crown becomes reduced in size. In the South and West, and in unfavorable situations, the tree becomes shorter, with a low, rounded crown not unlike that of the oak. Mature trees vary from 60 to 120 feet in height, and have a maximum diameter of eight feet. The elm usually has a rapid growth and a long life, although on sterile soils both these qualities are materially reduced. The most rapid growth is during the first 50 to 60 years; there is a falling off before the century mark is reached. The roots are long and fibrous, and run near the surface for a long distance. The tree can endure a moderate amount of shade. The associate species include nearly all of the common hardwoods, especially those with a preference for moist soils, as the walnuts, ashes, sycamores, Tulip-tree, birches, etc.

THE WOOD—ITS ECONOMIC USES.

The wood of the young elm is very tough, but is usually considered of not much value. When the tree has reached maturity it furnishes timber which is moderately strong, coarse-grained, difficult to split, not susceptible to polish, not durable, and liable to warp and check in drying. It is used chiefly in the manufacture of agricultural implements and carriages, and for flooring, cooperage, and saddle-trees.

SOIL AND SITE.

The preferable soil for the White Elm is a deep, alluvial loam which is never dry or lacking in abundant plant food. Failing to obtain ideal conditions, the tree adapts itself readily to soils less favorable, or even decidedly poor, and to an adverse climate. It is considered one of the hardiest trees

*Furnished by U. S. Forest Service.

for prairie planting, and is able to endure the great extremes of temperature and drouth of the treeless West. Few trees have been more generally used in prairie planting, and perhaps none is more generally adapted for the exposed and arid planting places of the western plains and prairies.

PROPAGATION.

Reproduction of White Elm is by seeds alone. If propagated for timber it should be done by artificial methods and not left to natural seeding. The rearing of the young plants in nursery beds is usually advisable. Occasionally, when seeds cannot be obtained, or when the nursery crop fails, the seedlings which spring up in damp, open places may be dug and used on the plantation site. One-year-old seedlings can be obtained from dealers at from \$3 to \$5 per thousand, but it is often economy for the local planter to grow his own stock.

The oval, winged fruit, with the seed inclosed in the center of the papery membrane, is produced in abundance nearly every year. It ripens in May, about the time the leaves appear, and should be gathered and planted at once. Seeds may be obtained from dealers \$1 to \$1.50 per pound, but it is safer to depend on home-collected material, because, since the vitality of unplanted seeds cannot be preserved more than a few weeks at best, those furnished by dealers are liable to be worthless.

The seeds may be gathered by sweeping them up from the pavements, shaking them down from the trees into a canvas spread out below, or collecting them in eddies or on sand bars where carried by streams. They should never be allowed to become dry from the time they mature until germination is complete. Planting should be done in nursery beds in rich, moist soil, an old garden spot being a desirable site. The seed should be sown in shallow drills in rows 8 to 12 inches apart for hand cultivation and 2 to 3 feet apart if a horse cultivator is to be used. In the rows the seeds should

be spaced 1 to 2 inches apart, covered about one-half inch deep, and the surface soil gently firmed down by means of a roller or by pressing with a board. Irrigation should be resorted to in times of drought, since a uniformity of moisture conditions is essential for successful germination of the seed and the most rapid growth of the seedlings. Shade for the young plants is not a necessity, although at times a partial protection from the hot sun or beating rain is beneficial. The seedlings may be transplanted to the permanent site when 1 to 2 years old, at which time they should be 6 to 12 inches high.

To produce the most shapely trees, some of the best nurserymen cut the young trees back to the ground when they are two or three years old from the seed. Vigorous sprouts start from near the wound; the best one is selected for the trunk of the tree, and all other sprouts are kept pruned off. The strong root forces up a tall, straight trunk, which adds to the form and value of the tree.

For prairie planting the White Elm may be set in rows from 4 to 6 feet apart each way. Where a heavy growth of grass exists it should be turned under a year or two before planting, and if possible a crop of cereals grown on the ground. The trees may be set in furrows or in holes dug by a mattock or spade. During the whole transplanting operations the roots should be kept constantly moist, and the dirt packed firmly around the newly-placed seedlings. Cultivation between the rows is advisable until the trees are large enough to shade the ground underneath. In the East the preliminary breaking of the ground is not so essential, although the young trees should not be allowed to become overtopped by weeds or grass.

White Elm may be grown in pure stands, or in mixtures with various rapid-growing, light-needing species, or with slow-growing trees if they are planted first and allowed to attain a height of 5 to 6 feet before setting the elm. Good associate species are the

Hardy Catalpa, ashes, locusts, coffee-tree, black walnut, black cherry, red cedar, and European larch.

ENEMIES.

Although seldom injured by wind, snow, or fungi, the White Elm is seriously affected by numerous insects. Borer larvæ channel the inner bark and the surface of the wood so frequently as to kill the tree; but by far the greatest damage is done by the elmleaf-beetles, and other leaf destroyers. In parts of the country park and street trees have been killed, and planting of the elm has been discontinued on this account. It is possible, however, by early and thorough spraying to protect the trees and in the end to bring about the reduction or extermination of the leaf-destroying insects. In case of extended ravages, specimens of the insect, together with a full account of the character of the injury done, should be sent to the Division

of Entomology of the Department of Agriculture, in order that the insect may be identified and measures suggested for its destruction or control.

POSSIBILITIES AND USES.

Stately and graceful in form and outline, and rapid growing and hardy in varied soils and severe climates, the White Elm adapts itself to the needs of most tree planters, and is grown extensively throughout its broad range. As a shade or park tree it has few equals, and throughout the East is considered the ideal tree for ornamental planting. It does not thrive in cities where soft coal is habitually used, nor along streets where the moisture is all carried off by artificial drainage. On the borders of gardens or cultivated land it is objectionable because of the extensive spreading of the surface roots. For Western planting it has a recognized place in forest plantations which it well deserves.

BEAUTIFYING THE STEEL HIGHWAY*

Splendid Achievements of the Boston and Maine in Railroad Forestry and Horticulture

BY

F. WILLIAM RANE

Director, New Hampshire College.

EVERYTHING that tends to make the world more beautiful, especially when the usefulness of such beauty can be appreciated and enjoyed by the greater masses, deserves commendation and appreciative acknowledgment.

In a quiet and persistent way our railroads are beginning to do what the writer predicts will eventually mean more to the nation's pride at home and its prestige abroad than some of our other efforts upon which we at present set greater value.

There is just as much reason why public sentiment should be interested in improving our great commercial highways as there is that our local and inter-urban roads be made better.

Every community gains its reputation in proportion to the interest its citizens take in its welfare. The old adage "A good reputation gets abroad that begins at home" is as true to-day as it ever was.

More has been done by American railroads to beautify the right of way, and particularly the stations and their

*Text and illustrations reprinted through courtesy of the Boston & Maine Messenger.

surroundings, than most people realize. Up to a comparatively recent period even the decoration of our homes has been quite largely neglected in the United States, and many of our people, while making large expenditures for paintings and other works of art, have allowed the very important feature of landscape gardening to go by default. There has even been a notable lack of harmony between architecture and landscape gardening in this country.

Happily, this condition has already undergone a vast change, and the

ation at heart, understands that a wise expenditure of money for landscape gardening and tree planting along his line is one of the very best investments for the present and the future that can be made, because of the effect it has in securing the co-operation and good will of the public.

To take as an illustration the Boston & Maine Railroad: This road traverses some of the most interesting and attractive country under the canopy. It not only furnishes the best of transportation facilities for business men, wage earners, tourists and "summer



Students digging White Pine Seedlings for transplanting.

American people are rapidly becoming better balanced in this respect.

Our railroads, or at any rate the larger systems, are taking an advanced stand with reference to the question of landscape effects and embellishments. Many roads take great pride in the effective planting of flowers and shrubs around station buildings, as well as in adopting modern architecture for these buildings, especially where they have reason to know that their patrons appreciate such efforts.

The far-sighted railroad manager having the best interests of his corpor-

boarders," but practically provides the life blood of industrial northern New England.

Not only has this progressive corporation set the pace in the matter of beautifying station grounds and thus helping to make communities more attractive, but it has done much to forward the interests of scientific forestry in New England.

It is a matter of gratification that more work of a practical nature is being attempted toward a solution of the forestry problem to-day than ever before. The writer is connected with

one of the New England colleges and has participated in the work of furthering a rational system of forestry for this section. In this work the co-operation of the Boston & Maine Railroad has been of decided value. Its representatives have attended the meetings of the Society for Protection of New Hampshire Forests and similar bodies, and on occasion of the Forest Congress in Washington last winter it was represented by a special delegate.

Through the courtesy of the officials, the writer has been enabled to become acquainted with a number of

station agent ten dollars' worth of tender bedding plants for the decoration and improvement of his station had, however, long been practiced by the company.

The practice of awarding prizes for effective plantings in the immediate vicinity of station buildings had greatly encouraged the agents in the work; but while for a short time during the latter part of the summer the effect of these efforts was pleasing, it did not satisfy Mr. Curtis, and he began in a quiet way to direct the efforts of his men toward a more permanent reward for their labors.



Rockingham Junction, N. H.—A sample of Modern Forestry.

the men immediately in charge of the carrying out of the landscape improvement work of the road.

Among those with whom he has talked and exchanged ideas is Mr. Lowville Curtis, general roadmaster of the Western Division, who has been in the employ of the company for a number of years and is not only an excellent engineer, but has a marked taste for all horticultural and forestry pursuits.

Four or five years ago scarcely anything important was being done in the way of embellishing the grounds about depots. The custom of allowing each

He began to advocate the use of perennial shrubs and vines. An interesting incident occurred about this time. Mr. Curtis learned that one of his laborers had worked in a nursery in the old country. Upon questioning him as to the proper way to propagate *nydrangeas*, the laborer replied in such fluency of scientific terms that Mr. Curtis at once directed his energies into the landscape gardening department.

According as he could be spared, the man took cuttings, collected seeds and plants and propagated and

brought together as many shrubs and plants as could be obtained.

In a short time, a small propagating house was constructed, in order to enable the men to continue the work during rainy days and in winter. While this house is comparatively small and inexpensive, it nevertheless stands for a large amount of work accomplished.

The greenhouse was constructed at

Although the work was started less than five years ago, it has grown so rapidly that practically all the available space in the immediate neighborhood of the office and yards is utilized for nursery purposes. Thousands of shrubs are being distributed all along the line of the Western Division and many are sent to other divisions, and yet the propagating area increases.

The nursery being located where



General View of the Boston & Maine Nursery at South Lawrence.

one end of the warehouse and supply yards of the Western Division at South Lawrence, Mass., where Mr. Curtis has his headquarters. One is struck with the happy manner in which the æsthetic is blended with the practical here—a department of shrubs for embellishing right of way merging into piles of rails, ties, switches and movable railroad property of all kinds.

the workmen naturally congregate prior to setting forth upon their various duties along the line, gives an opportunity to utilize the spare hours of these men, which in the aggregate means a great deal of time.

Nearly every arriving train brings one or more men from a completed job of some kind, and instead of "killing time" waiting for the next train, he spends his leisure to advantage hoe-

ing, digging, transplanting or performing some sort of nursery work. The men greatly enjoy the novelty of the labor too.

Often a large gang of men finishes work a few hours before quitting-time, and rather than start in on a new piece of work in which they could hardly make a beginning, this time is spent in the nursery. It surely has proven a great success, and a study of its workings would well repay any railroad corporation.

In forestry the work is going on in a somewhat similar way. Danger from forest fires is a most important factor in railroad management. The Boston & Maine road follows the practice of burning over the right of way by its section men and at once removing all inflammable substances.

To a certain extent, during a dry time, a system of patrol is carried out. Some of the accompanying illustrations show examples of forestry practices as carried out by the Boston & Maine. This road has purchased a number of small tracts adjoining the right of way and is encouraging the adoption of modern methods of forestry in developing these holdings. As with the work with shrubs, that in forestry is just beginning.

In one of the small groves eighty cords of wood were cut in thinning, and the growth remaining is far better for it. Mr. Curtis finds that in the quieter times of the year, it is possible to relieve a man here and there on a section for a day or so and have him report for duty on some of these wooded tracts, where his work is accomplished at no extra expense to the company. The company always finds ready use for all forest products.

The beautiful shady groves, such as those at Rockingham Junction, N. H., or Lowell Junction, Mass., are not only valuable forest properties of the railroad, but are more desirable and effective than any other possible sort of planting. To be able to while away one's time in summer at stations like these is a veritable pleasure.

Trees and shrubs certainly can be made to minister greatly to the comfort and pleasure of the traveling public.

The Boston & Maine planted two barrels of seed chestnuts along the Western Division in 1904. It has also started a large number of white pine seedlings in frames, and a few years ago Mr. Curtis imported a number of catalpa trees which he is experimenting with to determine their value in New England.

The time is not far distant when railroads generally will have their own nurseries, and when the embellishment of station surroundings, the covering up of unsightly embankments, etc., will be a matter of duty to them, as well as a source of pride.

More and more trees and groves will be planted and cared for, not only for their shade and beauty, but as a part of the railroad's economy in supplying ties, telegraph poles, piles, fuel, etc.

Were railroads to employ experts to formulate forestry plans, the small expenditure would yield abundant returns. Such an official could extend his influence by co-operating with the superintendents of parks and with city and town authorities in his district. In farming and wooded sections similar co-operation could be carried out with resulting better crops of fruits, vegetables and general farm produce and a corresponding improvement in forestry methods.

Assistance in this work undoubtedly could be had from the men engaged in teaching these branches at the various agricultural colleges and from the United States Department of Agriculture.

The work of beautifying and making our beloved country one that we can feel proud of at home or abroad is not only one in which governments and corporations, but public-spirited men, women and children everywhere should take great pleasure.

PROFITS FROM FOREST RESERVES TO BE SHARED BY COUNTIES

Ten per cent of Gross Receipts Alloted by Law to Offset Loss
in Taxes—Nearly Seventy-Seven Thousand Dollars this Year

WITHIN the last two years the area set aside for forest-reserve purposes has increased from less than 50,000,000 to more than 100,000,000 acres. Such a change caused great consternation among those who were not familiar with the objects to be attained by forest reserves. All the enemies of the National forest policy made ammunition of it, and many of its more timid friends began to fear that the movement was going too far. Most of the arguments of doubters, however, could easily be refuted.

There were two objections that could not be disposed of so readily—first, that this vast area, as large as all the New England and Middle States with Maryland and Virginia thrown in, took away from opportunity for agricultural settlement and home building many tracts of land scattered here and there along the creeks and valleys within the forest reserves. The Forester felt the propriety of this criticism keenly and studied carefully the boundaries of each reserve to eliminate as much agricultural land as possible. Finding that many small tracts remained, he submitted to the Secretary of Agriculture the "Agricultural Settlement Bill," which the latter recommended to Congress and which finally received the President's signature June 11, 1906.

Although under this law all land actually usable for home building will be brought within the reach of the people, there was another strong objection to the reserves, namely, that many counties in which reserves lie have much, in some instances more than half, of their area withdrawn from the possibility of private ownership and taxation. The Forest Service was not unmindful of the unfairness of this con-

dition and submitted a bill to grant 10 per cent. of the total receipts from forest-reserves to the counties in which they are situated. This proposed law was finally incorporated in the forest-reserve provisions of the agricultural appropriation act of June 30, 1906. The clause reads as follows:

"That ten per centum of all money received from each forest reserve during any fiscal year, including the year ending June thirtieth, nineteen hundred and six, shall be paid at the end thereof by the Secretary of the Treasury to the State or Territory in which said reserves is situated, to be expended as the State or Territorial legislature may prescribe for the benefit of the public schools and public roads of the county or counties in which the forest reserve is situated: *Provided*, That when any forest reserve is in more than one State or Territory or county the distributive share to each from the proceeds of said reserve shall be proportional to its area therein: *And provided further*, That there shall not be paid to any State or Territory for any county an amount equal to more than forty per centum of the total income of such county from all other sources."

The proceeds from forest reserves in the fiscal year ended June 30, 1904, were \$58,436.19. During the next fiscal year the receipts were \$73,276.15. The transfer of the forest reserves to the Forest Service was made February 1 of that year, and during the five months remaining the Forest Service was busy reorganizing the plans for forest-reserve administration. The result is notable. During the year ended June 30 last the receipts were \$767,219.96, which was more than a tenfold increase over the previous year.

The full measure of the importance

of this 10 per cent. provision can not, however, be taken from the figures of this year. The receipts from the reserves will probably increase with great strides for years to come, and the contribution to the counties is destined to make up richly for the loss of taxation.

The 10 per cent. contributed to the counties is safeguarded in the act by a provision that it must be spent entirely for the maintenance of schools and public roads. The State legislatures are allowed to direct the expenditure. Another safeguard is that the contributions from forest-reserve receipts must not in any case be greater than 40 per cent. of the taxes received from other sources.

The governors of all the States and Territories in which forest reserves are situated have been informed by letter concerning the amount which will come to each State at the present time from the forest-reserve proceeds of the last fiscal year. These letters say:

"* * * The payment of the 10 per centum thus provided will be made by the Secretary of the Treasury, who will determine the exact distributive share of (name of State). Pending this determination the following reports from the records of the Forest Service will show you the gross receipts from the forest reserves in your State during the fiscal year just closed and the approximate (but perhaps not the exact) amount which you will receive under the terms of the act just quoted. * * *

"It is with very great pleasure that I am able to notify you of this beginning of the direct contribution of the forest reserves to the counties in which they lie. * * * The proceeds from the reserves are likely to increase rapidly, so that this contribution, although it may not yet have reached an important figure, will ultimately pay a very considerable proportion of the expenses of the counties which are fortunate enough to have forest reserves within their boundaries. * * *

The sum which each State and Territory will receive this year is given below:

States.	10 per cent.
Arizona	\$7,976.68
California	8,192.12
Colorado	12,541.79
Idaho	6,436.24
Kansas	102.00
Montana	5,869.04
Nevada	24.00
Nebraska	790.35
New Mexico	4,694.55
Oklahoma	120.95
Oregon	7,587.36
South Dakota	3,599.05
Utah	9,786.86
Washington	1,936.43
Wyoming	6,781.50
Alaska	283.00

Total \$76,721.92

Alaska, being neither a State nor a Territory, is not entitled by the wording of the law to share in the distribution.



NOTES ON THE FORESTS OF HARFORD COUNTY, MARYLAND

BY

TREADWELL CLEVELAND, JR.

U. S. Forest Service.

THE soil and topography of Harford County are generally favorable to forest growth. As a whole the county is well forested; considerably over half its total area is clothed with forests of which a good proportion will supply merchantable timber. More than common economy has been shown in clearing. One rarely sees non-agricultural land, steep slopes, or hilltops denuded. On the contrary, it is striking that most of the farms are well supplied with woodlots, especially where rough or steep land would make agriculture only a temporary or partial success. Virgin timber, of course, is not to be found in important quantity, but the second growth, especially the coppice chestnut and oak, is chiefly vigorous and sufficient in quantity to supply demands for home consumption almost indefinitely. In the southern lowlands bordering the Chesapeake the heaviest stands of large timber are found. These have only recently been severely cut. Five or six years ago cutting began to take some of the best of this timber, largely for use outside the county. At the present time one of the best stands in Gunpowder Neck is being removed by a manufacturer in Kent County, who veneers red gum for fruit baskets.

The soil varies from a sandy loam and sandy clay toward the south along the Chesapeake to a loam in the interior of the county about Belair and a much rougher, stonier loam in the northern part toward the Pennsylvania boundary. Coupled with the rise in elevation from the Chesapeake inland this change in the character of the soil controls the distribution of botanical species. On the level southern low-

lands, for instance, the abundance of red gum in all stages of growth and particularly its spreading and vigorous reproduction are characteristic. With the red gum occur yellow poplar, white oak, red oak, Spanish oak, willow oak, and ash. Locust, an abundant tree throughout the county, and juniper are also found here growing to large dimensions. Several exceptionally large groups of juniper were noted. On leaving the shore and gaining a higher elevation and a different soil the frequency of red gum diminishes, while swamp, Spanish and willow oak practically disappear, scrub oak, chestnut oak, and chestnut increase in abundance and size, and sassafras also is found in larger quantity. The characteristic forest of this upland section of the county is chestnut and chestnut oak coppice. Another change from the snore line to the hills is the occurrence on the higher elevations of several species of natural and planted conifers. White pine, pitch pine, scrub pine and short-leaf pine were found. On the farms planted Norway spruce and silver fir and European larch had attained good size.

The abundance of locust merits special consideration in the county. Wherever good light reaches seedlings or saplings, as for example along fields and on the borders of the woodlot or forest glade, locusts are found in good numbers. Especially along roadside fences locust have secured a footing, apparently by the well-known means of the wind blowing winter-shed seeds over the fields and lodging them in drifts or against such obstacles as fences or underbrush. A good deal of planted locust is also found, but this,

of course, has but slight commercial importance in comparison with the natural groves and fence rows. The conditions of soil and climate seem particularly favorable to the healthy growth of locust practically throughout the county.

It is quite plain that farmers very well appreciate the serviceability of locust. It is a conspicuous tree about the farmstead, and evidently much prized for its beauty, shade, and supply of honey-producing flowers in early spring, but its main value is well understood to be its use for fence posts. The farms of the county, as a whole, are particularly well fenced. Although chestnut is the most common wood for these fences, locust is apparently much used for this purpose. There could be no doubt about its furnishing, on the whole, as serviceable fence material as any that could be had. In view of the natural vigor of locust of this region and of its unusual utility, there can be little doubt that a real investment might be made by planting the less fertile or more rugged parts of farms with this tree. Red gum is certainly one of the important trees of the county. Not only is it found in good dimensions throughout the lower, moister lands of the southeastern part of the county, but there seems also to be a growing tendency toward seeding up a good deal of cut-over or cleared lands with this tree. There can be little doubt, therefore, that in this part of the county red gum is destined to compete favorably with more important species, and eventually to assume a larger importance in the forest than it now enjoys. In view of the increasing use of red gum, since proper methods of handling it and drying are able now to cure its former defects, the red gum of Har-

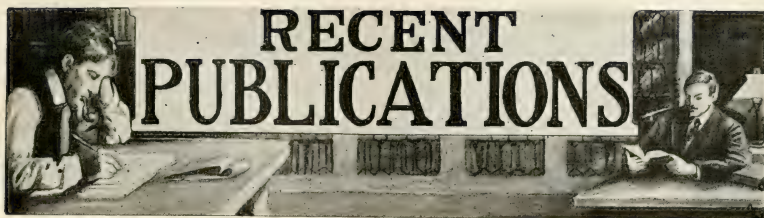
ford County has so much the more commercial importance.

Whole fields lying to the leeward side of the forest are occasionally seen growing up almost solid to juniper. The ability of this tree to withstand drought and intense light through all stages of its growth especially when very young, coupled with other favoring circumstances of soil and climate, have resulted in giving this tree a wide, important distribution in the county. How favoring conditions in general are for the growth of juniper may be seen especially in the very fine individual specimens which are a striking feature along road sides and lanes and bordering division fences. Since juniper furnishes probably the best fence posts obtainable, it is clear enough that a good deal of money value is represented in the hundreds of thousands of juniper posts now ripe for cutting or growing rapidly toward usable size.

Among the encouraging conditions for marketing forest products in the county are the unusually good roads which make transportation to the railways or to the waters of the Chesapeake easy and inexpensive. Though toward the northwestern part of the county the roads are so steep that much washing occurs, still the larger part of the county enjoys macadam roads of excellent quality. Up-to-date road-making engines are busy improving the poorer roads.

It would probably be a serious mistake to count on supplying demands for timber outside the county, but the changes in forest type from north to south give good opportunity to make exchange of one kind of timber for another, and it is always economical to be able to reach the sawmill without extra transportation expenses.





Appalachia—May, 1906. Published by the Appalachian Mountain Club. Pp. 196, illustrated. Boston, 1906.

The current number of Appalachia contains, in addition to the articles and club papers regularly issued, the reports of officers, proceedings of meetings, and official reports of the Appalachian Mountain Club for 1905. Among the contributed articles there is a very interesting paper on "The Proposed Eastern Forest Reserves," being compiled from an address delivered before the club by Mr. Gifford Pinchot, on January 20, 1906. In the reports of the councillors, Mr. Harlan P. Kelsey contributes a gratifying statement of the forestry work accomplished by the club and urges the perpetuation of New England forests. The pamphlet contains some very striking mountain views, particularly those illustrating Miss Annie S. Peck's article on climbing Mount Sorata.

Fourth Annual Bulletin of the Connecticut Forestry Association. Pp. 16, illustrated. New Haven, 1906.

This pamphlet contains a short concise statement of the progress in forestry in Connecticut and the need for its more general practice—in general a complete exposition of the forest situation in Connecticut. Mr. Austin F. Hawes, State Forester, contributes the leading article on the "Forestry Situation in Connecticut." In addition, the Connecticut laws bearing on forestry are appended, and the Connecticut Forestry Association, its aims and work, briefly described.

Proceedings of the Iowa Park and Forestry Association, Fifth Annual Meeting. Published by the Association. Pp. 133, illustrated. Des Moines, 1906.

This volume contains the complete proceedings of the meeting of the Iowa Park and Forestry Association held at Des Moines, December 11 and 12, 1905. Discussion of forestry occupies a gratifying amount of space, and includes an excellent paper by Mr. H. P. Baker on "How to Plant a Ten-Acre Lot to Trees," from the viewpoint of the Forest Service, and a contribution of value on the same subject from another viewpoint by Mr. B. Shimek.

Bulletin of the New York Botanical Garden. Vol. 4, No. 13, issued June 25, 1906. Pp. 308, illustrated. New York, 1906.

The volume here presented contains five papers by eminent authorities, describing contributions to flora of various localities, and descriptions of new species collected. To the botanist and student of native flora the book should prove valuable.

Irrigation in the North Atlantic States. Office of Experiment Stations, Department of Agriculture, Bulletin No. 167. By Aug. J. Bowie. Pp. 50, illustrated. Washington. Government Printing Office. 1906.

The bulletin presented here includes the results of investigations made in 1905 in Maryland, Delaware, Pennsylvania, New Jersey, New York, Rhode Island and Massachusetts to determine to what extent irrigation was practiced, and the various methods in vogue. The report shows conclusively that for market gardens and meadows, irrigation in humid sections has proven profitable. As yet its application in the raising of general farm crops has not been extensive. The cost of water, notwithstanding its abundance in the East, far exceeds that in the arid regions, and the suggestion is made that if this cost could be reduced, the application of irrigation would render the production of many crops profitable, which, with the present cost of water, are unprofitable. The descriptions of irrigation practice should be suggestive to many who are now raising truck without the aid of irrigation.

Topographic Development of the Klamath Mountains. Bulletin No. 196, U. S. Geological Survey. By J. S. Diller. Pp. 66, illustrated. Washington, Government Printing Office.

As its title indicates this bulletin contains an exhaustive analysis of the topographic features of those portions of Northern California and Oregon embraced in the Klamath range.

DEPARTMENT OF THE INTERIOR, Washington, D. C., July 3, 1906. Sealed proposals will be received at the office of the Engineer, U. S. Reclamation Service, Billings, Montana, until 2 o'clock p. m., August 23, 1906, for the construction of structures on Division 1, Gallatin Canal, Shoshone Project, Wyoming, involving about 18,000 cubic yards of grading, 1,800 cubic yards of concrete; the placing of 127,000 pounds of steel reinforcing bars and other incidental work. Particulars may be obtained from the Chief Engineer of the Reclamation Service, United States Geological Survey, Washington, D. C., or from the Engineer, Cody, Wyoming. THOS. RYAN, Acting Secretary.

DEPARTMENT OF THE INTERIOR, Washington, D. C., July 3, 1906. Sealed proposals will be received at the office of the United States Reclamation Service, Williston, North Dakota, until 10 o'clock, a. m., August 30, 1906, for the construction of canals and ditches, involving the excavation of about 220,000 cubic yards of earth and furnishing labor and material for various structures requiring about 40,000 feet B. M. of lumber, and 1,000 cubic yards of concrete, in connection with the Williston Project. Particulars may be obtained from the Chief Engineer, United States Reclamation Service, Washington, D. C., or from H. A. Storrs, Electrical Engineer, Williston, North Dakota. THOS. RYAN, Acting Secretary.

DEPARTMENT OF THE INTERIOR, Washington, D. C., June 11, 1906. Sealed proposals will be received at the office of the United States Reclamation Service, Salt Lake City, Utah, until 3 o'clock p. m., August 30, 1906, for the construction of the Strawberry Tunnel, involving 18,600 linear feet, more or less, of tunnel, the same being a portion of a system for the diversion of about 500 cubic feet of water per second from Strawberry River to the Spanish Fork Valley, Utah. Particulars may be obtained from the Chief Engineer of the Reclamation Service, Washington, D. C., or the Engineer, Salt Lake City, Utah. E. A. HITCHCOCK, Secretary.

DEPARTMENT OF THE INTERIOR, Washington, D. C., May 20, 1906. Sealed proposals will be received at the office of the United States Reclamation Service, Browning, Mont., until 2 o'clock p. m., July 31, 1906, for the construction of about 14 miles of canal for the diversion of 850 cubic feet of water per second from the St. Mary River at a point about 35 miles northwest of Browning, involving the excavation of about 1,700,000 cubic yards of material. Particulars may be obtained at the office of the Chief Engineer of the Reclamation Service, Washington, D. C., or from Cyrus C. Babb, Engineer, Browning, Mont. E. A. HITCHCOCK, Secretary.

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Forestry and Irrigation

H. M. SUTER, Editor

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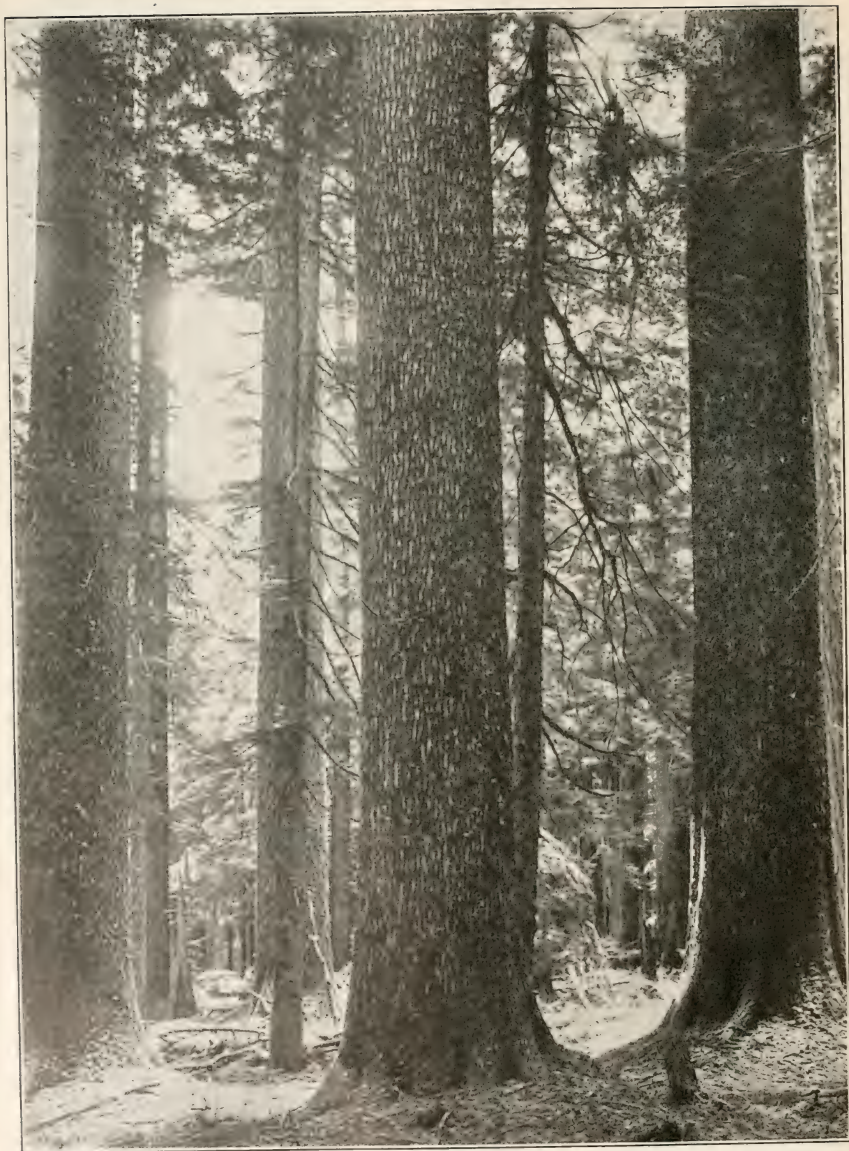
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A Magnificent Forest of Noble Fir, Hemlock, and Red Fir in Oregon



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No. 8

NEWS AND NOTES

Conference of Engineers

The Fourth Annual Conference of the Engineers of the U. S. Reclamation Service will be held at Boise, Idaho, September 3 to 8, the Fourteenth Irrigation Congress also being in session at Boise at that time.

This conference is in continuation of the general policy of holding annually a meeting of the principal engineers of the Reclamation Service for the purpose of discussing matters of administration and economies of work. The bringing together of these engineers and prominent citizens of the West make possible an interchange of views and a discussion of data leading to results of very great value in the furtherance of the purposes of the Reclamation Act.

Each of the engineers, experts and specialists in various lines will submit a brief paper embracing some point of general interest, such as detailed methods of cost keeping, of designing, construction, maintenance, or operation. Owing to the advanced condition of many of the irrigation projects now under construction it is expected that this conference will be of more than usual interest and importance.

Reclamation Service Birthday

The U. S. Reclamation Service recently passed its fourth birthday, and that it is a very vigorous infant is shown by a summary of the work accomplished during its brief existence.

Work is now under way on twenty-two projects and 13,000 acres of land have been actually irrigated. Up to July 1st 241 miles of main canal, 116 miles of distributing system, and 388 miles of ditches had been constructed, including dams, headworks, etc. Tunnels having a total length of more than five and one-half miles have been driven, including over two and one-half miles of the great Gunnison tunnel in Colorado. More than 581 miles of telephone lines have been installed and are now in operation; 233 miles of wagon road, many miles of which were cut in solid rock in almost inaccessible canyons, 110 bridges, and 300 office and other buildings have been constructed.

The works above mentioned have called for the excavation of 17,403,213 cubic yards of earth and rock, the laying of 134,446 cubic yards of concrete, 124,901 square yards of rip rap

and is well qualified for the responsibility of his position.

"In this connection it may be interesting to know that the fire warden estimates that at one time western Washington contained 239,554,560,000 feet of standing timber, but 420,000,000,000 feet has been destroyed by fire and 30,000,000,000 feet logged off. In other words, the forest fires have destroyed approximately 12,000,000,000 feet more merchantable timber than has been cut for manufacture up to date.

"It is to prevent further destruction of this valuable asset of the State of Washington that successful efforts were made to raise an adequate fund for forest protection this year, in the absence of a State appropriation.

"The board of forest commissioners has decided that the law relative to the use of spark arresters on engines, locomotives, boilers, etc., shall be strictly enforced this year, recognizing that the greatest menace to the forests is the operation of engines not equipped with proper meshing, as required by law. The commissioners, by resolution of August 28, 1905, ordered that the netting of spark arresters used in coal burning engines should be not less than three mesh, No. 12 wire to the inch, and that the netting of spark arresters on wood burning engines should not be less than six mesh No. 16 wire, to the square inch.

"Section 10 of chapter 164 of the 1905 laws of Washington amply covers this particular feature, as follows:

"Section 10. It shall be unlawful for any person, company or corporation to operate any spark-emitting locomotive, logging or farm, engine or boiler, in this State at any time during the months of June to October, inclusive, or for any person to operate any logging or other engine or boiler in the immediate vicinity of any forest, slashing, chopping, wood-land or brush-land during the closed season without such locomotive or engine provided with and uses a safe and suitable device for preventing sparks who shall fail to provide and use such spark arresters during the period herein mentioned shall, upon conviction, pay a fine for each engine or locomotive of each day so operated without such spark arrester not less than ten or more than fifty dollars, and shall be prohibited from further use of such locomotive and engine until such spark arrester is provided and used therein. * * *

Deputy fire warden and forest rangers shall report a lack of sufficient attorney of their county and the superior court of that county where said law is first instituted shall have jurisdiction of the offense."

Deputy fire warden and forest rangers shall report a lack of sufficient attorney of their county and the superior court of that county where said law is first instituted shall have jurisdiction of the offense."

"Many of the mill companies have asked the commission to appoint their woods foremen forest rangers, to serve without compensation from the State. These men have full authority in the fighting of forest fires in our various districts.

Resolutions on Death of Mrs. Lundy

The following resolutions of condolence were recently adopted by the Pennsylvania Forestry Association, which we take great satisfaction in reprinting here as a slight appreciation of Mrs. Lundy's work in the cause of forestry in this country:

"It is with profound sorrow we record the death on May 24th of our highly esteemed associate and friend, Mrs. J. P. Lundy. Mrs. Lundy was one of the founders of the Pennsylvania Forestry Association in 1890, and has been continuously throughout these twenty years a member of its council and during most of the time corresponding secretary. Her courage, earnest, untiring and wise devotion to the cause of intelligent forestry, especially in the early years of the movement, when the heroism of the pioneer educator in a great and beneficent cause was the essential element of success. Mrs. Lundy was by her words and deeds, an inspiration and example that won advocates for the cause so dear to her, and we are sorely grieved that she was spared to see the

fruits of her labor and effort in the almost universal recognition of and the adoption and application of measures she so ably advocated that are becoming beneficent results not only to the State but the entire nation.

"Therefore be it resolved, That the members of the Pennsylvania Forestry Association hereby express their deep sense of the loss to the cause of forestry, of the wise counsel, the earnest work, the splendid example, the noble exalted life and the true friend that, in the Providence of God, has been taken from us, whose memory will always be cherished by all true lovers of the forest.

"Be it also further resolved, That we hereby tender our sincere sympathy to the members of Mrs. Lundy's family in their bereavement.

"Resolved, That a copy of this Minute and these Resolutions be sent to the members of Mrs. Lundy's family, to *Brest Leaves, to FORESTRY AND IRRIGATION*, and a copy entered on the records of the Association.

"WM. S. HARVEY.

"MIRA L. DOCK.

"ALBERT LEWIS.

"Committee on Resolutions of Con-
dole.

Michigan Fire Losses

According to a report compiled by Harry H. Ryerse, chief fire warden of the State, there was destroyed by forest fire in Michigan during May property to the value of \$359,357, with the loss in Dickinson County, where considerable havoc was done, as yet unestimated.

The greatest loss occurred in Luce County, where the damage amounted to \$101,300. In Presque Isle County damage amounting to \$75,075 was done, and in Marquette \$41,775. Ontonagon suffered to the extent of \$5,525, Baraa \$2,300 and Iron \$1,000.

The fire warden reported 160 separate and distinct fires during May. The expense of his department in fighting the flames was \$867.50.

Progress of Reclamation Work

Mr. C. E. Grunsky, consulting engineer of the Reclamation Service, has just returned to Washington from an extended trip of several months duration to the irrigation projects of the West. He has participated in important conferences of consulting engineers, where advice was necessary in the conduct of the work, or plans were under consideration to solve engineering and other problems which are constantly arising as each project advances from its preliminary stage, when its feasibility is to be determined, to the final stage of actual delivery of water upon the land.

Mr. Grunsky talks with great confidence of the ultimate success of the work which Congress has inaugurated, and is a firm believer in its further extension. Projects of a magnitude far beyond the reach of the present reclamation fund will no doubt in time be authorized. In the meanwhile every effort is being put forth by the Reclamation Service all along the line to advance the work in hand and to be able at an early date to show satisfactory results. The difficulties as they arise, many of them being other than the obstacles interposed by nature, are being met on every hand with a determination to win out, and it is with much satisfaction that an able handling of these as well as of the ordinary engineering problems may be noted.

The general prosperity of the country is having its effect upon the cost of the work. Labor is difficult to obtain in desired amount, and the price of materials required has considerably advanced since the work of the service was commenced. In consequence of these conditions the cost of irrigation will be higher than it would have been with works constructed some years ago. But this is offset by a corresponding increase in value of the products of the irrigated farm, and is no occasion for alarm. These conditions have no doubt in some measure contributed to some of the recent failures of contracting firms on irrigation work. Where such failures have oc-

and is well qualified for the responsibility of his position.

"In this connection it may be interesting to know that the fire warden estimates that at one time western Washington contained 239,554,560,000 feet of standing timber, but 42,000,000,000 feet has been destroyed by fire and 30,000,000,000 feet logged off. In other words, the forest fires have destroyed approximately 12,000,000,000 feet more merchantable timber than has been cut for manufacture up to date.

"It is to prevent further destruction of this valuable asset of the State of Washington that successful efforts were made to raise an adequate fund for forest protection this year, in the absence of a State appropriation.

"The board of forest commissioners has decided that the law relative to the use of spark arresters on engines, locomotives, boilers, etc., shall be strictly enforced this year, recognizing that the greatest menace to the forests is the operation of engines not equipped with proper meshing, as required by law. The commissioners, by resolution of August 28, 1905, ordered that the netting of spark arresters used in coal burning engines should be not less than three mesh, No. 12 wire to the inch, and that the netting of spark arresters on wood burning engines should not be less than six mesh No. 16 wire, to the square inch.

"Section 10 of chapter 164 of the 1905 laws of Washington amply covers this particular feature, as follows:

"Section 10. It shall be unlawful for any person, company or corporation to operate any spark-emitting locomotive, logging or farm, engine or boiler, in this State at any time during the months of June to October, inclusive, or for any person to operate any logging or other engine or boiler in the immediate vicinity of any forest slashing, chopping, wood-land or brush-land during the closed season without such locomotive or engine is provided with and uses a safe and suitable device for arresting sparks. Any person, company or corporation

who shall fail to provide and use such spark arresters during the periods herein mentioned shall, upon conviction, pay a fine for each engine or locomotive of each day so operated without such spark arrester of not less than ten or more than fifty dollars, and shall be prohibited from further use of such locomotive and engine in such months or season until such spark arrester is provided and used therewith. * * * Deputy fire wardens and forest rangers shall report any lack of sufficient spark arresters to the prosecuting attorney of their county, and the superior court of that county where suit is first instituted shall have jurisdiction of the offense."

"Many of the mill companies have asked the commission to appoint their woods foremen forest rangers, to serve without compensation from the State. These men have full authority in the fighting of forest fires in their various districts.

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curred the engineers in charge have proven themselves well qualified to carry on the work by force account, and there is every prospect that results will be highly satisfactory when compared with prices originally bid state Canal on the North Platte River in Wyoming and Nebraska, from which, by the aid of some temporary structures, water has been available since May 5th.

Referring to the situation on the Lower Colorado River, he states that the entire river (about 20,000 second feet) is now flowing into the Salton Sea, instead of into the Gulf of California, where it belongs, and adds that the Southern Pacific Railroad company, which has come to the aid of the canal company, is putting forth great efforts to turn the river back into the channel leading to the gulf. The railroad company has completed a spur track from El Rio at Pilot Knob, southerly into Mexico, and is prepared to push the work on the closure of the present channel with the utmost vigor.

Irrigation in Shoshone Reservation There are several sources of large water supply in the ceded portion of the Shoshone Indian Reservation, Wyo., which was thrown open for settlement on August 15.

The ceded portion of the Shoshone Indian Reservation is the area lying north of Wind River and east of Popo Agie and Bighorn rivers. It lies in the northern central portion of Fremont County, Wyo., and includes also a small corner of Bighorn County, adjoining Bighorn Canyon south of Thermopolis. The total area is about 2,000 square miles. The northern third of this area lies in the Owl Creek and Shoshone mountains and the southern portion comprises a wide region of

when such work was offered for contract.

Among the projects that have been advanced to the point of delivering water Mr. Grunsky reports the Inter-rolling plains in the Wind River basin. The area is bordered on the south by Wind River and its eastern margin is crossed by Bighorn River. These streams carry a large volume of water and flow in flat-bottomed valleys, along which there is a moderate acreage of land that is immediately valuable for agriculture.

With a mean average rainfall of about 13 inches a year, the climate is too arid for the raising of crops without irrigation, but a large amount of water in the two principal rivers is available for this use. Along the bottom lands bordering the rivers the water can be taken out in small ditches, though, owing to the spring floods, there will be difficulty in maintaining these ditches and especially their headgates, and the amount of land that can be irrigated by this means is small. By the construction of irrigation canals, however, wide areas of the basin land could be brought under cultivation, especially if the flood waters of the mountain slopes were stored for use during the dry season. The greater part of the region is well adapted for grazing and this undoubtedly will be its principal use. Fully two-thirds of the land bears a fair growth of nutritious grasses, and water for stock is within reach, except in a few districts.

The only settlers now in the ceded area are a few Indians and white men who have married squaws. The ranches of these people are widely scattered along the rivers and on the creeks near the foot of the mountains.



NOTES ON THE BENGUET PINE

Interesting Description of One of the Two
Pines Indigenous to the Philippines

BY

WILLIAM M. MAULE

Forester, Philippine Bureau of Forestry.

EARLY BOTANISTS recognized several species of pines indigenous to the Philippines, but, so far as known at present, we have only two representatives, viz: *Pinus insularis* and *Pinus merkusii*. Of these two species the former is by far the more abundant and widely distributed and is now counted among our commercial woods.

Pinus insularis, because of its abundance and use in Benguet Province, has come to be known as "Benguet pine." Its habitat is restricted to the higher mountain region, at elevations rarely less than 1,600 feet above the sea, in the provinces of Benguet, Lepanto-Bontoc, Abra, and Nueva Viscaya, where, owing to topography and to local conditions, the stands are irregular, both in density and in outline.

Again we find it localized within a small area on Mt. Iba, in central Zambales, which is probably its southern limit.

In northern Zambales, on the upper slopes of the same Cordillera, *Pinus merkusii* covers an area of about 1,000 acres and is not known to occur elsewhere in the archipelago. The latter species, aside from the simple fact of its occurrence, is otherwise interesting from its having been reserved during the Spanish regime, when it was known as the "Kings' pine" (Los pinos del Rey). Notwithstanding this decree, they were utilized to a small extent in the manufacture of naval stores.

The restricted manner in which the pines occur is no doubt due to altitude, with the accompanying high tempera-

tures. The best stands are those occupying the protected valleys and slopes where the soil is deeper and trees are less exposed to strong winds. On such sites the stands are more compact, with greater clear length. On the ridges and elsewhere in exposed positions the stands partake of a more open character, with trees of low spreading crowns and short, heavy boles.

The soil is a uniform reddish clay loam, and, owing to the constant moisture attendant to high altitudes, rarely becomes dry. Surface rocks are not abundant except in certain areas where they outcrop as a result of former volcanic action. A portion of these are hard and resist erosion well, but the greater amount are of a soft character and yield readily to atmospheric action.

In the zone where the pine attains its best development, pure stands are the rule, with a sprinkling of tree ferns and small broad-leaf trees along the streams.

On descending the slopes below an altitude of 1,800 feet, a gradual transition is apparent; the stands become more open and irregular, with at first a sparse mixture of broad-leaf species, and, finally, at about 1,500 feet, the pine disappears.

FORM.

The different forms which the pine assumes on various sites makes it difficult to recognize the typical tree. Under most favorable conditions of soil and situation, and where fires have not entered, one finds stands growing in almost as close order as is characteristic of the white pine (*Pinus stro-*

bus). When growing in close order, the stems are long, straight and fairly cylindrical, with but little root swelling, often free of branches for more than fifty feet.

The species is less tolerant than the white pine and mature stands having grown in open order rarely have clear lengths exceeding two-thirds the tree height. The taper in the clear length is very gradual, but decreases in diameter rapidly in the crown. The maximum diameter is attained in the shorter boled trees where the stand is more open, but rarely exceeds 56 inches at breast high.



Typical Benguet Pine (*Pinus insularis*)

Two types of bark are readily discernible, seemingly irrespective of health or age—the one decidedly polygonal scaled, as of *Pinus ponderosa*; the other vertically, furrowed similar to *Pinus strobus*.

The Benguet pine, being decidedly intolerant, forms an open spreading crown, with needled branches well towards the interior and consequently receives a great amount of light. From the seedling stage, its light-demanding nature is apparent, and reproduction is rarely effected under shade. It is a rapid grower and abundant and regular seeder, being well adapted to the locality. From this fact we may infer that had it not been subjected since remote times to injury from fire, we would find to-day a vast unbroken forest, of close order, covering the natural range of the species.

The following table, showing diameter growth, was derived from a series of stump analyses. While we cannot be sure (owing to the irregularity of seasonal growth in tropical species) that each ring represents a year's growth, yet we know that at least one ring is formed annually, and the age in relation to diameter, therefore, is not underestimated.

DIAMETER, BREAST HIGH.

Inches.	Years.
15	37
16	38
17	39
18	40
19	42
20	43
21	45
22	47
23	48
24	50
25	52
26	54
27	57
28	60
29	64
30	72
31	82
32	95
33	120
34	145



A Stand of *Pinus merkusii*, Zambales

FIRES.

The pine region is the natural haunt of the Igorote, who leads a semi-nomadic life, depending largely for his existence on the chase, and not infrequently owning horses and cattle. In order to secure better pastures or to facilitate hunting, it has been his custom to yearly set fires in the open grass lands. These fires do not confine themselves, however, to the grass areas, but spread through the semi-open into the forest, each year claiming additional open space.

The open and burned over areas are most favorable to natural seeding of pine, and where fires have not recently occurred we find excellent reproduction. If four or five years pass without burning, or when the reproduction has reached a height of two or three feet, the critical stage seems to have passed. This is due to the close formation having crowded out the rank grass which is ever a menace to reproduction. It happens, in cases, that seeding has been poorly effected, leaving the reproduction to grow in

open order and consequently exposing it to danger from fire. In the event of fire in the latter case, where the trees have reached a height of three to four feet, a certain portion usually recover. Counts made on such areas show the proportion which survive to average 25 per cent. In the seedling and stages immediately following, the trees can offer no resistance and fires are totally destructive.

LUMBERING.

During February, 1903, a Government reserve was created, which includes forest lands in the vicinity of Baguio, and lumbering thereon—except for Government needs—was prohibited.

More than two years ago the Benguet Commercial Company installed logging and sawing machinery near Baguio. The plant consists of a portable engine 25-horsepower, which drives a 50-inch circular saw. The maximum capacity of the mill is 3,000 feet, board measure, although the cut averages about 2,000 feet per day.

As accessories are planer and shingle mill, which are operated alternately with the saw mill.

Skidding is done by means of a drum and steel cable, driven by a 12-horsepower engine.

American foremen direct the sawing, planing, and shingle making, assisted by a crew of fifteen natives.

The advantage of a steam skidder over the use of carabaos is at once apparent, and is the only means by which many of the steeper slopes can be lumbered profitably.

The lumber finds a ready market in general construction work about the summer capital, and, in order to meet demands at present, the mill is kept running day and night. The logs are remarkably free from defects, such as heart rot, but the boards warp considerably when not properly piled. As a rule, the lumber is very resinous, but occasional pieces are as clear and free of resin as an average grade of white pine.

The stumpage price, which is the Government charge, represents \$1.20 per thousand, board measure, while the average selling price is \$50. The number of merchantable trees per acre will average from eighteen to twenty, from which nine or ten are selected for felling. Allowing an average of 90 cubic feet of merchantable timber per tree, we have for the stand, per acre, 1,710 cubic feet. Stands of considerable extent are found, however, which will yield four or five times the above amount. There is no doubt but a severer selection would be more favorable to reproduction, but would destroy the esthetic, which it is important to retain for those who would enjoy the summer resort.

SUPERVISION.

With the beginning of lumbering about Baguio, the Bureau of Forestry installed a system of management, which has been largely protective. During the critical season of fires, or February, March, April, and May, a force of native fire wardens is employed, each warden being assigned a

section—if possible, the locality in which he resides. Trees are selected for felling by the forestry officer, who resides permanently at Baguio.

In general, fires have been appreciably checked and lumbering regulated and carried on in a conservative manner. The Igorote, who is responsible for the greater number of fires, has been found to be the most satis-



View Showing Character of Bark of
Pinus merkusii

factory man in fighting them, using as weapons only pine switches. In case the fires have made too great headway the Insular police are called upon to assist. The many roads and trails leading out from Baguio serve well the purpose of fire lines, and, except in the event of very strong winds,



Surface Fire in Open Pine Stand, Consuming Grass Cover

are effective in localizing them. Still other aids are the stretches of sod or earthen fences which the natives have built around their plantation to pro-

tect their crops from wild hogs and deer. These enclosures are occasionally abandoned and are commonly encountered in the open land.



Yarded Logs Near a Saw Mill

UNCLE SAM, AUCTIONEER

How the Government will Assist in the Development of a Desert Area

A RATHER UNIQUE scheduled event is to take place in southern Idaho by the time this number of FORESTRY AND IRRIGATION reaches its readers, when Uncle Sam will offer for sale the lots contained in two town sites situated in the heart of the Minidoka irrigation project.

This project provides for the reclamation of about 130,000 acres lying on both sides of Snake River. The land was all public domain and when the engineers designed the system they did not neglect the splendid opportunity for establishing an ideal farming community. Three town sites were laid out in the center of the tract on the proposed line of the Oregon Short Line railway; the towns were platted with wide streets and boulevards, and parks and extensive areas for public buildings were reserved. All the agricultural lands were cut into farms of 40 and 80 acres, so that the instant the tract is brought under cultivation it will become one of the most densely populated agricultural communities in the country. Its prosperity is assured by the unfailing water supply which will be furnished by the big Government canals and ditches, and this prosperity will be reflected in the future success and substantial growth of the towns which Uncle Sam proposes to establish there.

Two years ago the Minidoka country was an uninhabited sage brush plain. The railroad was miles away and it seemed destined forever to serve only as a haunt of the jack rabbit and the skulking coyote. Far below the surface the Snake River cut its way through a canyon across the plain, offering no opportunity for the pio-

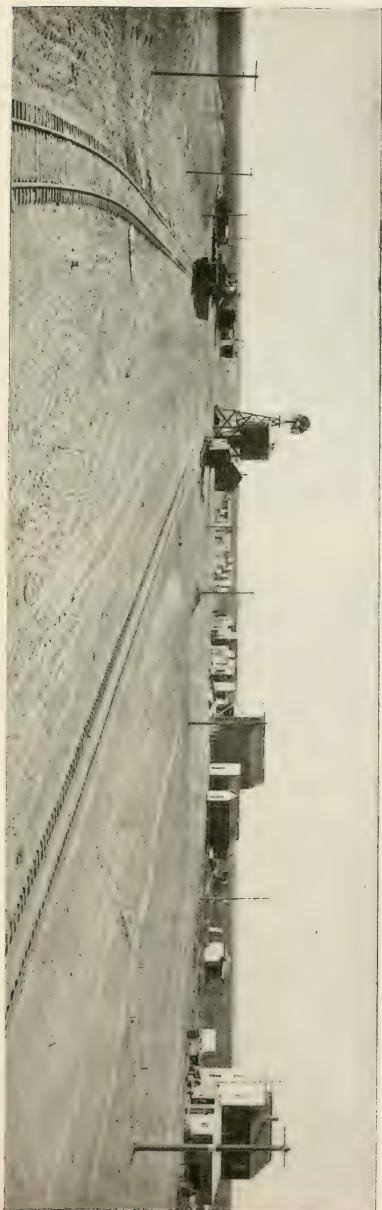
neer with his simple ditch to lead the water out upon the thirsty soil. Only skilled engineers backed by vast capital could tackle such a proposition as this. Many men without the necessary money had looked at it, but its great cost had forced them to give it up. With the passage of the Reclamation Act on June 17, 1902, one of these engineers who had joined the Government force rushed a field party to this point and in a single season prepared and presented a set of plans for a comprehensive system of irrigation. They were accepted and bids were asked and contract awarded for construction.

To irrigate this broad expanse of plain the Snake River must be lifted from its bed, and a dam was laid across the stream at Minidoka Rapids, a great rock fill structure 50 feet in height and 650 feet long on top, which raised the water surface 47 feet at flood level and backed it up for thirty-five miles. The dam is near completion and will cost nearly half a million dollars. When the immense gates in the diversion channel are lifted the water will pass into the high line canals on both sides of the river and be led from them through hundreds of miles of laterals to every farm in the valley.

The initiation of this work was followed by an influx of settlers from all over the country, and soon every farm division had been filed upon. While the Government proceeded with the construction of the dam and canal system, the settlers were busily engaged upon their own buildings. The coming of large numbers of farmers created a market and stores sprang up.



Main Street in Rupert, Idaho. A Thriving Town Made Possible by Government Irrigation Work



Heyburn, Idaho, Looking Southwest



A Chicago Reporter's Publishing House at Heyburn, Idaho



View Showing the Regulating Gates of the Minidoka Project, Idaho

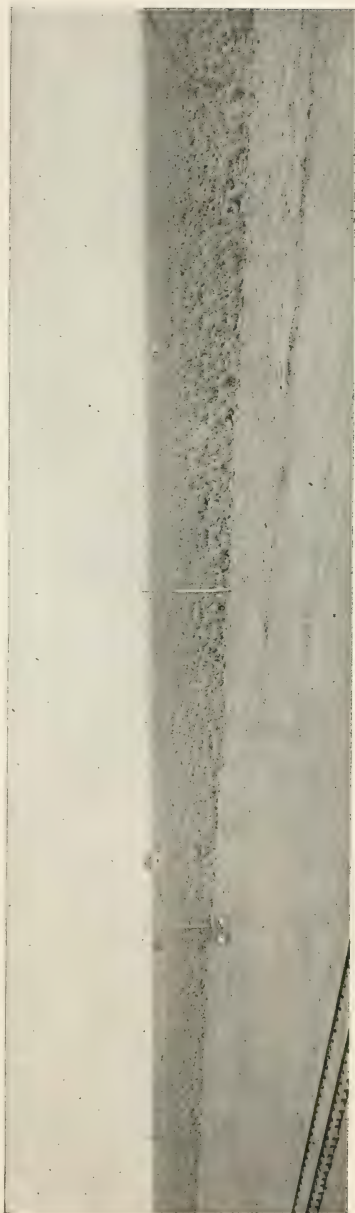
An enterprising young man established a newspaper and as if by magic doctors, lawyers, and mechanics of all classes flocked in. The intoxication of creation was in the air. Other newspapers were started, three banks were established, a school was opened and 70 pupils greeted the teacher the first morning. Meanwhile two lines of steel like ribbons came creeping over the plain, crossed and passed the town sites, and the shriek of the locomotive was added to the creaking of the derricks as great blocks of stone were dropped into place on the dam.

To-day a population of over 4,000 await the completion of the canals and ditches. Scattered here and there in and around the town sites are 122 mercantile institutions waiting for the town lot sale so that they can move over upon their own property and no longer remain tenants by sufferance of the Government.

Idaho is famous for its irrigated fruits and fields. The soil and climate are adapted to a wide variety of crops. Owing to the importance of the live stock industry in this section alfalfa and other forage crops will always find a profitable market, and all the vegetables and fruits of the north temperate zone may be grown here.

With all these manifold advantages a prosperous future and rapid growth are assured for the new towns. The lots in Sherrer will be reserved for future sale. An important feature in connection with the construction of the irrigation system is the possibility of power development at the dam. This power can be transmitted economically to the towns and utilized for municipal and other purposes.

The optimism of the settlers on the Minidoka project has gone abroad through the enterprising little newspapers which have grown and flourished on the sage brush desert, and before another month is past hundreds of tenderfeet will "hit the trail" for this land of opportunity.



The Sort of Land that is to be Reclaimed in the Vicinity of Rupert, Idaho



View of Spruce Forest in Western New York State from the summit of the Spruce Knob in the Adirondacks, N. Y.

MANNER OF OCCURRENCE—CHARACTERISTICS OF GROWTH.

Within the limits of its range the chestnut occurs either singly or in scattered groups or groves, usually most abundant on the high, gravelly, well-drained hillsides and ridges, and seldom in pure stands.

Chestnuts grown in the forest vary greatly in general form and habits from those grown in parks, pastures, and other open places. The forest tree soon loses its lower branches and develops a tall, tapering trunk, adapted for telegraph poles, ties, and for general use as lumber. But when grown in the open and given plenty of room, it develops a broad, spreading crown, and short, thick trunk.

The chestnut's rate of growth is the most rapid of any of our truly valuable hardwood trees. Seedlings usually attain a height of 10 to 15 inches the first year and continue growing at the rate of 15 to 20 inches per annum for twenty to thirty years. Sprouts grow even more rapidly than this, often attaining a height of 4 to 6 feet the first year, and in twenty to twenty-five years make timber large enough for ties and poles. After thirty years, however, the rapid growth ceases. In New Jersey a chestnut is recorded which had a diameter of 60 inches when 70 years old. In the same State several trees 35 years old ranged from 24 up to 34 inches in diameter, with a height of 40 to 50 feet. The average rate of growth is, of course, far less than the above. It varies according to the nature of the soil, the thinner soils being less favorable to rapid growth than rich upland soil.

The root system spreads out extensively, but no deep tap root is developed. This makes transplanting less difficult than with many other nut-bearing trees. The chestnut is rather intolerant of shade.

THE WOOD—ITS ECONOMIC USES.

The wood is light, rather soft, coarse-grained, and inflexible, the sapwood white, the heartwood darker

brown. The wood shrinks and checks considerably in drying, splits and works easily, and because of the tannic acid it contains is very durable in contact with the soil. It is used in cabinet work, cooperage, for interior finishing, fence posts, telegraph poles, and cross-ties. About 5 per cent of the railroad ties in the United States are of chestnut. The original chestnut forests have everywhere been cut, except in parts of the Southern Appalachians, but the reproduction of the coppice is so rapid that a fair supply of small-sized timber is still available.

PROPAGATION.

Chestnut reproduces easily both by seeds and stump sprouts. Nuts are borne nearly every year and a full crop occurs usually every other year, thus keeping the ground well seeded. The nuts that are spread by the squirrels germinate readily and, if there are enough of them, quickly reclothe the ground with seedlings. They grow, however, only in pasture land and open woods, since they can not tolerate dense shade. Their growth may be encouraged by leaving seed trees, protecting the nuts from chipmunks and squirrels, and breaking the ground where the nuts fall.

By far the more common and rapid means of chestnut reproduction is by the coppice sprouts which spring from the newly cut stumps. While not so long lived nor so sound as seedling trees, the coppice sprouts should be encouraged because of their rapid growth and ease of propagation. A clear cutting of chestnut forest in the fall or winter when the trees are dormant, taking care to leave smooth stumps, is all that is needed to insure a future growth. In the Middle and New England States a clear cutting system with a rotation of twenty-five to thirty years gives the best results, and will in that time produce trees large enough for fuel, ties, or posts. A stump will retain the power of sprouting with almost undiminished vigor through several rotations. By starting a small number of seedling

trees of the same or other species among the chestnut coppice and allowing them to live through two or three rotations of the sprouts, large timber trees may be secured. The chestnut is admirably adapted to several systems of forest management.

For commercial or ornamental planting either nursery culture or direct field planting may be practiced. In either case the nuts should be gathered when mature in the fall and stratified in moist sand through the winter, care being taken that they do not dry out after ripening, or become moldy in the sand. If placed in single layers between alternate layers of moist sand in a strong box, out of doors in a sheltered place, they may be depended upon to winter safely.

If started in the nursery the rows should be 3 feet apart, and the nuts placed 1 foot apart in the row and covered 1 to 2 inches, and may be set in the plantation in the spring when either 1 or 2 years old. If transplanted several times in the nursery the plants are improved, but this is usually too expensive to be practiced in economic planting.

For extensive operations direct placing of the nuts in their permanent location is cheapest and best. Fall planting is advised if the planted nuts can be protected from mice and squirrels. Holes should be dug and 2 or 3 nuts placed in each and covered about 2 inches deep, and the dirt packed down quite firmly. The holes should be dug 5 to 6 feet apart. The chestnut will thrive in pure stands, but can be grown to better advantage in mixtures. It is especially adapted for planting with the white and red pine on waste land in New England, and can also be combined with the oaks, ash, and maples.

ENEMIES.

The chestnut as a forest tree is as a rule little troubled by insets or fungi. Several forms of borers work in the wood and under the bark, and their ravages are sometimes extensive. The nuts are attacked by the

larvæ of two or more species of weevil, but to the timber grower this is not serious. In case insects of any kind appear in alarming numbers, specimens, accompanied by a detailed account of their appearance and habits as far as determined, should be sent to the Division of Entomology of the Department of Agriculture for identification and suggestions as to their control. The trunks of the young trees in warm situations are often affected by a body blight, or sun scald, as it is called. The bark cracks and loosens on the south and west sides of the tree, and the affected portion finally dies. The extent of injury from this source is, however, not great. new disease of unknown cause has been doing considerable injury during the past ten or fifteen years.

POSSIBILITIES AND USES.

For protective and commercial forest planting few eastern trees are deserving of greater commendation than the chestnut. Among our long-lived hardwood trees it is difficult to find its equal in rapidity of growth and ease of propagation on soils which are good or medium in quality. It is amenable to various systems of forest management, forms a vigorous coppice, yields a wood which is valuable for a variety of uses, and produces a very valuable nut.

The tree grows so extensively in the East that almost no planting has been done except for ornament and for the production of the nuts. In the West little chestnut planting has been done because it is popularly believed that the tree does not generally thrive west of the Mississippi, but in Kansas, Nebraska, and Missouri the few trees that have been started are doing well.

PLANTATIONS.

Mr. L. A. Goodman, of Kansas City, Mo., has two rows of chestnut trees on his estate in Westport. They

were twice transplanted before set out, were well cared for, and when 20 years old were 40 feet high, with a spread of 28 feet.

At Farlington, Kans., chestnuts were set out with black cherry, black

locust, black walnut, and a few catalpas, 4 feet apart each way. They were set in 1882, and in 1895 were 3 inches in diameter breast high and 28 feet high, and free from live branches for 10 or 15 feet.

SHIFTING FORESTS

Thousands of Trees and Shrubs Transplanted on the Grounds of the Jamestown Exposition

IN THE WORK of beautifying the grounds of the Jamestown Exposition, near Norfolk, Virginia, many thousand trees and shrubs have been transplanted. Some of them were brought from long distances and carefully transplanted along the walks and drives of the exposition grounds. The work was done under the direction of Warren H. Manning, the well known landscape designer, and Charles H. Pratt, superintendent of the grounds.

Concerning the transplanting of trees and the attention they require, Mr. Manning said:

"Watching, mulching, watering, trimming, fertilizing is the order of the day now on the Exposition grounds. The trees and shrubs are being closely watched to note their behavior after the shock of removal. The removal of a plant means a loss of roots and a change in conditions that requires, especially in the larger trees, a large stock of vitality to secure a safe recovery. First, the roots that help to pump the water from the ground to the leaves to supply the loss from evaporation must get to work promptly; some trees are dead because the drainage was not good enough to take the standing water out of the holes, and the tree roots were drowned, as they surely will be if the roots are completely submerged in water for a long time. Others, we know, died because a sudden freeze following a rain-storm caught the roots before sufficient top soil could be secured to cover them completely.

"Some of the cedars, as they were being rafted across the waters of the marsh, were caught in a sudden squall, and their roots were given an involuntary salt water bath; these trees seem to lack sufficient vitality to make a good recovery, or perhaps their roots were cut too short.

"With all the adverse circumstances that must come to trees moved for miles in all weather over all sorts of roads, and planted in soil only recently drained, the loss in the fifteen hundred big trees promises to be below the average of the first year of such planting. The loss in the shrubs is, with very few exceptions, much below the average. Some of the finest kinds, like the evergreen, wild myrtle, the wild roses, flowering dogwood and mountain laurel are almost all alive and growing vigorously.

"Mulching, that is covering the surface over the roots, helps newly-planted shrubs to gain a foothold, because it keeps an even condition of temperature and moisture at the roots. We are using coarse manure, grass and leaves for this purpose. The manure supply, always an important consideration, is here secured by supplying the contractors with bedding for their horses with the understanding that they allow the manure to be used on the plantation. Thus grass that must be cut, and would otherwise be useless is made to bring a return, just as a return of fertilizer is secured from the ashes of the brush and wood that is burned in the clearing operations.

"Where trees and shrubs are growing vigorously little or no water is required, but where they are starting slowly, then the ground about the roots is well water soaked about once a week in dry weather. About the tree holes are punched to the depth of the roots, and these holes are repeatedly filled in succession until the ground is soaked. A light daily sprinkling is often worse than useless, as it causes the surface to bake hard—a condition more favorable to rapid evaporation of moisture than is a mulched or loosely dug surface.

"Trees and shrubs were either not trimmed at all or the tops were reduced by removal of whole branches

instead of by cutting off the ends of branches and leaving unsightly stubs. The plants were thus not mutilated in appearance, and where well rooted and vigorous started at once into good growth, as have most of the shrubs. The trees are more closely watched, and where they show a tendency to start into more vigorous growth part the way down the branch they are trimmed back to this point.

"Insect enemies must also be watched for, as they are likely to spread rapidly and do serious injury, so an equipment for spraying must be ready at hand for such an emergency. Raising trees and shrubs, like raising children, require constant care."

THE GUNNISON TUNNEL

Good Progress Being Made on One of the Most Difficult of the Government Projects

THE ENGINEER in charge of work on the Gunnison tunnel, Uncompahgre irrigation project, Colo., reports that 718 feet were excavated during July, making the total amount of tunnel excavated to date 14,614 linear feet. Less headway was made in July than in previous months on account of the friable material encountered in heading No. 2, the accident by a premature explosion in heading No. 1, and the quantity of water flowing in at the latter heading.

Headings 3 and 4 have finally been brought together, and the most disagreeable part of the work is now over. This is the portion under the broad valley of Cedar Creek, where the tunnel has been for nearly a mile in river sands and gravels, clay and soft shale. Heading No. 4 was driven from the outlet in the valley, and number 3 from a shaft a mile away, under conditions such that it was very difficult to give directions so that the tunnels driven towards each other would exactly meet.

The completion of this portion of the work leaves it possible to concentrate work on the headings numbers 1 and 2, which are under the main portion of the mountain. In No. 1 the material is a hard reddish quartz or coarse granite, changing to a mica schist. In this portion the progress has been upwards of 12 feet a day, while in the softer black shale in heading No. 2 the progress has been over 20 feet a day.

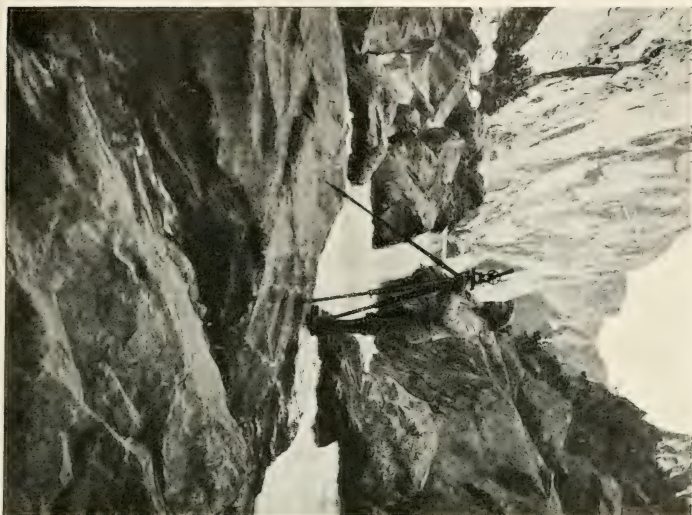
The work on the tunnel was delayed by a curious condition. This was due to a heading advanced to a point where it was passing through a great accumulation of sea shells. Thousands upon thousands of them imbedded in the rock were dug out, some of them of gigantic size—upwards of three feet or even more in diameter.

The process of excavating the shells was easy but they rendered the ground exceedingly treacherous. A few of these large shells imbedded in the roof make a point of weakness, and without warning a mass of a hundred pounds

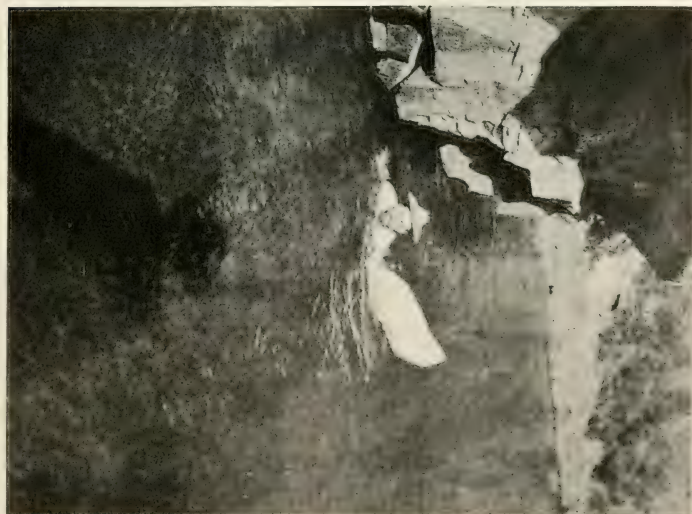


Congressional Inspection Party Mouth of Gunnison Tunnel, Now 15,000 Feet Within the Mountain.

Surveying in the Canyon



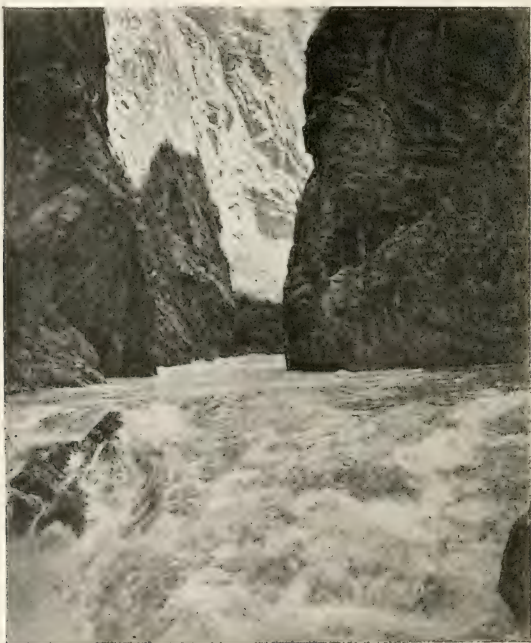
An Engineer of the Reclamation Service Exploring the
Gunnison Canyon is Forced to Swim



or even of several tons of the black shale carrying the shells might be precipitated upon the workmen. It was therefore necessary to support the roof of the tunnel with timber for every foot of advance in order to protect the workmen from injury or death.

It is curious that these shells deposited in the ocean millions of years

interest by engineers throughout the country by reason of the fact that it is the longest and largest underground waterway of its kind in the world. Its total length will be 30,000 feet, its cross section $10\frac{1}{2}$ by $11\frac{1}{2}$ feet, and its capacity 13,000 cubic feet per second. It is to be cement lined throughout and completed in 1908 at an approximate cost of \$2,000,000. For the



Dam Site in the Grand Canyon of the
Gunnison River, Colorado

ago are now being brought to light and are endangering the lives of creatures hundreds of centuries younger than they.

Each one of the shells at one time held a living organism, whose bulk would be sufficient to make a meal for a dozen men.

The work on the Gunnison tunnel is being watched with a great deal of

greater part of its length the tunnel is in solid granite, in some places 2,000 feet below the surface of Vernal Mesa.

This tunnel will carry water from Gunnison Canyon over into the valley of the Uncompahgre River where it will be used to irrigate about 150,000 acres of fine agricultural land.

THE MADISON PROJECT

Plan to Reclaim Large Area of Montana Arid Land

AN investigation of the Madison River irrigation project, Mont., was recently completed by the engineers of the U. S. Reclamation Service, and a report made to the Secretary of the Interior. Numerous surveys have been made by various corporations and individuals since 1887 for the purpose of locating a feasible irrigation system in this vicinity, but no practicable project was found. Owing to the fact that approximately 150,000 acres of land very advantageously situated with respect to market, and with exceptionally good railroad facilities, located near Helena are believed to be reclaimable from Madison River, a careful reconnaissance was made by the Reclamation Service in 1905.

The main unit of the project outlined by the engineers consists of about 43,000 acres of land in and adjacent to Prickly Pear Valley near Helena; a second tract of about 53,000 acres lies in Crow Creek Valley on the west side of the Missouri River near Radersburg, and smaller tracts aggregating about 52,000 acres bring the total reclaimable area up to approximately 148,000 acres.

The plan in brief is to construct a storage dam in Madison River Canyon, the stored water to be discharged into Madison River as required, and at a point about seven miles below the dam, near the mouth of Cottonwood Gulch, diverted by means of a weir into a canal on the west bank of the river. This canal will run in a northerly direction along the left bank of Madison River for about thirty miles, crossing the Jefferson River by a siphon over three miles long in the vicinity of Willow Creek, and thence parallel but at some distance from the west bank of Missouri River to a point

on McClellan Creek, into which its waters discharge. For about two and one-half miles the channels of McClellan and Prickly Pear creeks will be used, the waters being diverted from Prickly Pear Creek near East Helena, the canal then encircling Prickly Pear Valley, discharging into a coulee at its lower end.

The entire length of the canal would be 150 miles, including sixteen miles of tunnels, twenty-seven and three-quarter miles of concrete lined sections, four miles of siphon pressure pipe, 99½ miles of earth canal and two and one-half miles of natural stream channel. There is one drop of seventy feet, and a drop of 160 feet in the stream channel.

A small independent part of the project contemplates the irrigation of about 16,000 acres on the east bank of Missouri River in the vicinity of Toston and Townsend, by a canal diverting water from the Missouri River on its right bank about three and one-half miles above Toston and running in a general northerly direction for about thirty miles. There are 5,140 acres of cultivated land below the projected canal line location irrigated from Dry, Greyson, Gurnet, and Duck Creeks and Confederate Gulch. If satisfactory arrangements could be made with the owners of these water rights their lands could be watered from the canal and the water from the creeks used on lands above the canal, and this area, 5,140 acres, now watered, has been included with the 16,800 acres of irrigable land. There are probably 3,000 acres north of Confederate Gulch that could be irrigated by extending this canal to Avalanche Gulch, but as this would involve many additional miles of canal it has not been considered.

Most of the land is in private ownership. The crops are principally alfalfa, oats, wheat, and rye.

The estimated cost of the project without storage is \$254,000. On a basis of 16,000 acres this gives a cost per acre of \$15.12; adding \$5 per acre for maintenance and operation for ten years, gives a cost of practically \$20 per acre without storage. Sufficient data is not at hand to warrant an estimate on the cost of storage, which must be known before it is possible to decide upon the feasibility of the project.

The unregulated discharge of the Madison River at the proposed point of diversion would, in some years, be sufficient to supply the canal throughout the irrigating season, but in other years there would be a shortage in July, August, and September. On account of this shortage, and for the

further reason that the entire low water flow of Madison River is being used for power development at points lower down on the Missouri River, it will be necessary to regulate by shortage practically the entire discharge of Madison River, and this would be provided for by the dam in Madison River Canyon, which would create a reservoir with a capacity of 600,000 acre-feet.

The total estimated cost of the entire Madison project is \$14,413,000. On a basis of 147,800 acres this gives a cost per acre of \$97.50. Allowing \$5 per acre for ten years maintenance and operation brings the cost up to about \$102.50 per acre. The long canal line with its expensive river crossings, tunnels and other structures necessitated by the topography of the country, are responsible for the high cost of construction.

CALIFORNIA GROUND WATERS

Important Publications on Southern California by U. S. Geological Survey

THE RESULTS of an extremely practical and purposeful investigation of the ground water resources of the coastal plain region of southern California have recently been published by the United States Geological Survey. These reports cover the region along the coast from Santa Monica to Aliso Creek, and extend inland over the coastal plain to the foothills from San Pasqual on the northwest, through Santa Anita, Glendora, Pomona, and San Bernardino, to San Jacinto on the southeast.

Throughout this whole area the people are dependent mainly upon ground water for their water supply, and much of the prosperity that has been realized in this country has resulted from irrigation by ground waters. Therefore the future is largely dependent upon the availability of these waters and their permanence.

The reports mentioned deal with these questions in a practical way and show where ground waters may be obtained, the depth at which they occur, and what may ultimately be expected if the present improvident use of the water is continued. In order that the reports may be distributed in the most helpful manner the region has been divided into the western, central, and eastern sections, and each has been treated in a separate bulletin.

The western section includes the Redondo and southern half of the Santa Monica quadrangles. This region may be geographically defined as that part of the country lying westward from a line running north from San Pedro Bay through Los Angeles and Glendive to La Crescento. The central section includes the Downey and Las Bolas quadrangles, and may be geographically defined as land lying

eastward from the line above located to a north and south boundary defined by Westminster, Whittier, and Monrovia. While the central section includes the area lying to the east of this as far as San Bernardino and San Jacinto.

Completed tables giving the facts concerning the wells throughout this region are included in the reports. They show the yield of each well, the capacity, and depth at which water occurs, as well as the cost of operation.

With reference to the supply of the entire region the report states that in all of the important basins there has been during the last ten years a general reduction in the yield of the artesian wells. The last ten years have constituted a period of low rainfall, and as a result the ground water supply has been diminished, and it is evident that there should be no further increase of the drafts upon the underground resources. The rate of this decrease even under the influence of the great development that has taken place has been very slow, and while it is probable that in some basins some of the favorably located wells will never cease to flow, the shrinkage must continue in other places unless there is a concerted effort upon the part of the irrigators to be economical in the use of water.

The summary given by the author of these reports, Mr. Walter C. Mendenhall, is as follows:

The supply is large, since it consists of the water saturating all that part of the coastal plain gravels within about 250 feet from the surface over an area of 600 or 700 square miles.

The annual additions to the supply are large, consisting of a part of the flood waters of the San Gabriel, Los Angeles, and Santa Ana Rivers, together with the return waters from irrigation and the local rainfall. The drafts upon this supply are also large and seem certainly to be in excess of the supply in certain parts of the region.

With present developments the water plane must be expected to decline slowly and the artesian to shrink until drainage is checked by this shrinkage to a point where it no longer exceeds the supply. This decline should not prove serious if present developments are not increased, but so long as this development continues at a rate which increases the output, the shrinkage will also continue.

The lowering of the ground water level and shrinkage of artesian areas will no doubt be interrupted by periods of rising water levels.

The shrinkage of an artesian belt will be manifest along its northern edge, and the effect farther south will be rather a decrease of flow and a lessening of pressure.

Shallow artesian wells will generally be affected earlier and to a more marked extent than the deeper ones.

One of the maps included in this series of reports shows the artesian areas and the shrinkage which has already occurred. For example, the great artesian area running along the coast from a point west of Los Angeles to a point south of Santa Ana already shows a shrinkage along its northern and eastern borders equal to about one-fourth of the original area, while that south of Pomona shows a shrinkage of approximately 10 per cent. The San Bernardino area has likewise been reduced about one-half, and that north of San Jacinto shows a shrinkage along its northern border equal to about one-fifth of the original artesian area.

These reports should be consulted by every irrigator along the coastal plain. They give most potent warnings concerning the loss of water supply which, it appears, may be avoided if intelligent measures are adopted. Inasmuch as this garden spot of North America has been developed solely as a result of irrigation by ground waters, it appears that the inhabitants of the region can do no better than to organize and adopt such measures as are recommended in these reports.



Government Irrigation Work During the Month

For Lippincott's Place

Mr. Louis C. Hill has been designated supervising engineer of the southern part of California, including Colorado River and the Yuma project, in addition to his work in Arizona, to fill the place made vacant by the resignation of Mr. J. B. Lippincott.

Mr. Hill was born in Michigan and graduated from the State University in 1886. He was engaged constantly in railroad, mining, and canal work until 1903, when he received an appointment in the United States Reclamation Service. He has charge of the construction of the Salt River project, which is now in course of construction and is already world famous for its wonderful engineering features.

Here one of the highest dams in the world is being erected, creating an artificial lake twenty-five miles long and 200 feet deep against the dam. A cement mill with a capacity of 300 barrels per day is in operation, turning out first-class cement for use in constructing the dam, lining ditches, and tunnels. The work also involves a power house, power canal, electric transmission line, and the rebuilding of a considerable part of the distributing system in Salt River valley. Saw mills have been erected to furnish lumber for the system, and over one hundred miles of wagon road were constructed. Sixty miles of this road connects the outside world with the dam site, which is in an almost inaccessible canyon, and is used for hauling supplies to the army of workmen em-

ployed there. Engineers who have driven over it pronounce it a marvel of engineering skill, unequalled in this country.

Mr. Hill is regarded as one of the ablest engineers and executives in the country, and although the loss of Mr. Lippincott's services was a severe one, the people of southern California are to be congratulated upon the wise choice of his successor.

Henny's Appointment

Mr. D. C. Henny has been designated as supervising engineer for California, excepting that portion of the southern part of the State including the Colorado River and Yuma project, which has been assigned to L. C. Hill, supervising engineer for Arizona, and the Owens Valley under L. H. Taylor, supervising engineer for Nevada.

Mr. Henny now has charge practically of the entire Pacific coast area, including the States of Washington, Oregon, and California. This change was brought about by the resignation of Mr. J. B. Lippincott, supervising engineer for California and the Klamath irrigation project lying partly in Oregon.

Mr. Henny is a graduate of the Government Polytechnic School, Delft, Holland. He was engaged for several years in reclamation work and railroad location in Holland, and has been engaged in railroad construction in Iowa; in waterworks construction in various Eastern States; in railroad construction in Colorado; bridge work

in Missouri; tunnel construction, New York; and in many other important positions throughout the United States. Both the Reclamation Service and the states to which his services have been assigned are to be congratulated on the possession of one of the finest engineers in the country. His

tion project, California and Arizona, has tendered his resignation to the chief engineer and will accept the position of city engineer of Los Angeles, Cal. His resignation will take effect September 1st.

Mr. Hamlin was born and educated in Minnesota. He has had wide ex-



HOMER HAMLIN

A well known engineer who recently resigned from the Reclamation Service to become City Engineer of Los Angeles, California

headquarters at present are at Portland, Ore.

**Hamlin
Resigns**

Mr. Homer Hamlin, of the U. S. Reclamation Service, and district engineer in charge of the Yuma irriga-

tion project, California and Arizona, has tendered his resignation to the chief engineer and will accept the position of city engineer of Los Angeles, Cal. His resignation will take effect September 1st.

Mr. Hamlin was born and educated in Minnesota. He has had wide ex-

and Coronado Beach, draftsman in the surveyor's and city engineer's office in Los Angeles. In 1901 he was employed by the United States Geological Survey in hydrographic and geological investigations, and in 1903 he received an appointment as engineer in the Reclamation Service.

Mr. Hamlin's resignation was accepted with much regret by the officials of the service, as the demand for good engineers is greatly in excess of the supply. This is especially true in Government work on account of the low salaries paid by Uncle Sam as compared with those received in private practice.

Engineer Drowned

Information has been received at the Washington office that Mr. I. W. Huffaker, of Wheatland, Cal., assistant engineer in the U. S. Reclamation Service, has been drowned in one of the canals of the Truckee-Carson irrigation project, about five miles west of Fallon, Nev.

While awaiting the arrival of a survey party Mr. Huffaker and one of his assistants decided to go in swimming at a point where the water surface of the canal was about 60 feet and the depth of water between eight and nine feet. Both of them were poor swimmers and he sank while attempting to swim across the canal. His companion, Mr. Wilbur, was barely able to save himself.

Mr. Huffaker has been engaged in general surveying in Montana and in the construction of iron smelters. In 1903 he was appointed engineering aid in the Reclamation Service on Walker River basin and since the fall of that year has been constantly engaged on the Truckee-Carson project, having had charge of the construction of the Carson River diversion dam and Lake Tahoe outlet regulation work.

Hondo Project

Mr. B. M. Hall, of the Reclamation Service, and supervising engineer for New Mexico, Texas, and Oklahoma, who is in Washington for a few days on business connected with his

district, reports a most promising state of affairs on the Hondo irrigation project in southeastern New Mexico.

All contracts are completed, earthwork on the laterals is finished, and nothing now remains undone except some of the small structures in the distributing system, and some puddling in the reservoir. This work is being carried on by force account under the supervision of the engineers. The settlers have been receiving the usual low water supply throughout the season, but next spring they will enter into their proper heritage, the reservoir being completed and an ample water supply for all needs assured.

Although the land under this project is all in private ownership, Mr. Hall reports that most of the farmers are cutting their farms down to forty acres. This action will insure a dense population, more intensive cultivation, and a consequence increase in the value of the land. The marvelous results of irrigation in this section when sufficient water is applied has been demonstrated in the Roswell district lying just to the east of the Hondo project. Four crops of alfalfa are harvested, while corn, garden truck, cantaloupes, grapes, apples and other fruits produce abundantly. The delicious flavor of irrigated fruits is becoming well known, and the apples which are shipped to Chicago and other Eastern markets command a high price.

Next year one-tenth of the cost of construction of this project, or \$33,360, will be returned to the reclamation fund to be used again in the construction of other projects.

Contracts with Water Users

The Secretary of the Interior has executed a contract with the Sunnyside Water Users' Association, Washington, to secure repayment to the United States of moneys expended in the construction of the Sunnyside irrigation project, Wash.

A contract on behalf of the United States with the Yuma County Water Users' Association, organized in con-

nection with the Yuma irrigation project, California-Arizona, to secure the return to the Government of the cost of the Yuma project, has also been consummated.

**Nebraska
Phone**

The Secretary of the Interior has approved the contract entered into by John E. Field on behalf of the United States Government, and the Platte Valley Telephone Company, of Scottsbluff, Nebr., whereby the above named company agrees to furnish telephone service in connection with the North Platte irrigation project, Nebraska and Wyoming.

It was found necessary to establish telephone connections between the headgates of the Interstate Canal, located at Whalen, Wyo., and the various headquarters, camps and stations of the Reclamation Service, in order to expediate the work of constructing the irrigation system. Eleven stations will be installed at the various camps and the company will place additional wires on the poles of its lines now in operation or to be constructed between Whalen, Wyo., and Camp No. 8 in Nebraska, and construct and maintain such new lines as may be necessary to connect the telephone stations with each other and with the various exchanges in the district lying between Guernsey, Wyo., and Bridgeport, Nebr. Long distance service may also be had with the Pathfinders dam site, located above Alcova, Wyo.

**Montana
Phone**

The Secretary of the Interior has granted permission to the St. Mary's International Telephone Company, of Browning, Mont., to construct a telephone line on the Blackfeet Indian Reservation from Browning, on the Great Northern Railroad, northerly to the International boundary line through and by way of Babb, Teton County, Mont., a distance of about fifty miles.

Arrangements have been made with the company for the transmission of messages in connection with the Milk River project, which is being con-

structed for the irrigation of lands in northern and northeastern Montana by the U. S. Reclamation Service. This service will be of inestimable value in expediting the work on the project as well as in future operation of the system.

**Ft. Shaw
Lands**

The Secretary of the Interior has authorized the engineers of the Reclamation Service to survey and subdivide the lands in the Fort Shaw abandoned military reservation, Montana.

These lands are needed in connection with the Sun River irrigation project, which is designed to reclaim about 256,000 acres in the valley of Sun River. A large percentage of this land is public domain and lies in a broad prairie extending from Teton River on the north to Sun River on the south, a distance of thirty miles, and from the Rocky Mountains on the west to Missouri River on the east, a distance of seventy miles. The sum of \$500,000 has been allotted from the reclamation fund for initiating this great work.

**Examination
of Clark Fork**

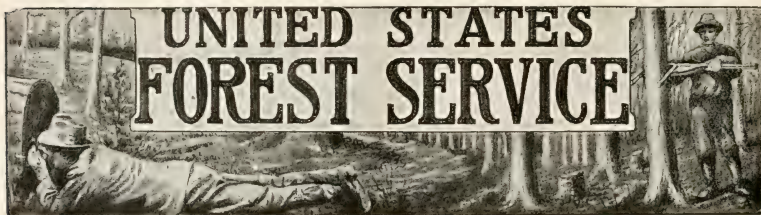
In response to requests from the residents of Carbon County, Mont., the Reclamation Service recently made a reconnaissance of the elevations and approximate areas of irrigable lands on the east side of Clarke Fork near the Montana-Wyoming State line. It has long been the belief of settlers in that locality that large bodies of land are so situated as to be irrigable from Clarke Fork.

It was found that a tract of land known as Chapman Bench lies along Pat O'Hara Creek for a distance of twelve miles. This bench has an average width of one and one-half miles and contains approximately 12,000 acres of good land which lies well for distributing water. Owing to its high elevation above Clarke Fork Canyon, however, and the long rough country through which the canal would run, any scheme for irrigating the land from the waters of Clarke Fork is not considered feasible. There is no other tract of land from the lower end of

this bench north to Chance, Mont., with the exception of a few small scattering areas not worth considering.

Along the stream bed of Big Sand Coulee there are several small areas of land from one to several hundred acres in extent that lie low enough to be watered from the Fork, but these could all be readily handled by private capital. One tract of 3,000 acres in extent well up on the stream and at an elevation of approximately 4,400 feet above sea level, probably could be watered very economically by divert-

ing water from the proposed high line canal of the Shoshone project. There is about 6,000 acres of good land on the Sand Coulee drainage. All the remaining land in the vicinity of Big Sand Coulee and to the east of the Chapman Bend is of sand dunes and bad land breaks. The tract of land known as Big Mesa is in the Shoshone drainage and is properly a part of that project. It is too high for irrigation from Clarke Fork without a dam several hundred feet in height and tunnels aggregating several miles in length.



The Month in Government Forest Work

Personal Mention

Mr. E. A. Sterling, in charge of forest extension in the Forest Service, has just returned from the Adirondacks, where he has been studying the forest planting work which is being done by both the State Forest Commission and the Cornell Forest School. On these plantations it was found that Scotch pine, white pine, and European larch are being grown so successfully that these trees may be regarded as specially well suited for reforestation work in this region. At Lake Clear, where the State work is in progress, Norway pine is now to be tried with every prospect of success. Douglas spruce, otherwise known as Western red fir, is also being planted. On the other hand, the soil is too poor for successful planting work with Norway spruce.

Mr. Sterling starts immediately for the West, to inspect extension work on the reserves. He will first visit Flagstaff, Arizona, and thence will proceed to California, will go up the coast and return by way of the Rocky Mountain reserves. The reserve extension work is growing in extent and importance constantly. In addition to the permanent planting stations, where seed oeds and nurseries are maintained to supply plant material for planting work, either locally or at a distance, special attention is now being directed to the study of city watersheds lying in reserves. A number of reserves which surround or nearly touch cities and towns contain the sources which supply these places with water. To perpetuate and in many cases to increase the available water supply, forest planting is the most efficient, often the only means.

Another new project in extension work is the establishment of rangers' nurseries. Rangers will be encouraged and assisted to make a good showing in small nurseries, in which suitable species for planting in each locality are to be tried.

Mr. Bristow Adams, former associate editor of *FORESTRY AND IRRIGATION*, has been appointed to a position in the office of the editor, Forest Service. Mr. Adams is especially well fitted for his work with the government, having had a long experience in newspaper and editorial work. He will be particularly valuable to the Forest Service because he has had an intimate knowledge of the forest movement during the past five years, as well as a thorough understanding of irrigation problems which are often closely related to forestry. Readers of the magazine will recall a number of articles which Mr. Adams has contributed, both on forestry and irrigation subjects.

Mr. Gifford Pinchot, Forester of the U. S. Department of Agriculture, returns August 21 from Europe. He left Washington July 7 last. The National Irrigation Congress will be held at Boise, Idaho, September 3 to 8, inclusive, and owing to the close community of interests between the Reclamation Service and the Forest Service, this meeting will bring together a large number of those interested in forest work, both in public and private life. Mr. Pinchot, who has been invited by Gov. Pardee, of California, through the executive committee of the Congress, will attend. The Congress is the fourteenth held in the interest of irrigation.

Mr. William L. Hall, in charge of forest products, in the Forest Service, has been for some time in the West, where he is engaged in the administrative inspection of the timber tests being carried on at various points in co-operation with Western universities. His return is expected by the middle of September.

Captain James B. Adams, special fiscal agent of the Forest Service, and in charge of the office of records, is in the West, where he will preside at a number of meetings of forest supervisors. These meetings have for their object a fuller understanding on the part of forest officers of the provisions of the "Use Book," or manual of instructions and regulations for the use of the resources of forest reserves, as well as a closer and more personal relation between reserve officers and Washington. Reserve problems will be discussed and each supervisor will be able both to bring forward his own difficulties for solution and to contribute out of his own experience toward the solution of the difficulties of others.

The first of these supervisors' meetings will be held at Glenwood Springs, Colo., August 20 to 24, and the following forest officers will have instructions to attend: F. R. Sherwin, Jr., forest ranger in charge of the Pikes Peak Forest Reserve, Colo.; Thomas Hogan, forest ranger of the Park Range Forest Reserve, Colo.; Eugene Williams, supervisor of the West Mountains and San Isabel Forest Reserves, Colo.; R. W. Shellabarger, supervisor of the Cochetopa Forest Reserve, Colo.; James A. Blair, forest ranger in charge of the Leadville Forest Reserve, Colo.; W. R. Kruetzler, forest ranger in charge of the Gunnison Forest Reserve, Colo.; David Anderson, forest ranger in charge of the Battlement Mesa Forest Reserve, Colo.; Harry Gibler, forest ranger in charge of the White River Forest Reserve, Colo.; O. C. Snow, forest ranger in charge of the La Sal Forest Reserve, Colo.; H. N. Wheeler, supervisor of the Montezuma Forest Reserve, Colo.; F. O. Spencer, supervisor of the San Juan Forest Reserve, Colo., and forest inspector W. T. Cox. The second meeting will be held at Provo, Utah, headquarters of the Uinta Reserve, from August 25 to August 27. Forest Inspector Potter, in charge of grazing, and Forest Inspector Benedict, who alternates with Forest Inspector Du Bois in charge of the office

of reserve organization, will be present. The reserve officers instructed to attend are: C. T. Balle, supervisor of the Fish Lake Forest Reserve, Utah; G. H. Barney, supervisor of the Aquarius Forest Reserve, Utah; Sylvanus Collett, ranger in charge of the Dixie Forest Reserve, Utah; Charles F. Cooley, supervisor of the Grantsville Forest Reserve, Utah; J. F. Squires, supervisor of the Bear River Forest Reserve, Utah; William Hurst, supervisor of the Beaver Forest Reserve, Utah; Dan S. Pack, supervisor of the Payson Forest Reserve, Utah; E. H. Clarke, supervisor of the Salt Lake Forest Reserve, Utah; W. I. Pack, supervisor of the Uinta Forest Reserve, Utah; Lorum Pratt, supervisor of the Grand Canyon Forest Reserve (North), Ariz., and Timothy C. Hoyt, supervisor of the Sevier Forest Reserve, Utah. Forest Inspector W. W. Clark will also be present. The third meeting will take place at Flagstaff, Ariz., September 1 to 6. The following forest officers have been instructed to attend: Fred S. Breen, supervisor of the Black Mesa, San Francisco Mountains and Grand Canyon (South) Forest Reserves, Ariz.; R. C. McClure, supervisor of the Gila Forest Reserve, N. Mex.; C. T. McGlone, supervisor of the Chiricahua Forest Reserve, Ariz.; F. C. W. Pooler, supervisor of the Prescott Forest Reserve, Ariz.; W. H. Reed, forest ranger in charge of the Tonto Forest Reserve, Ariz.; Harold Marshall, forest ranger in charge of the Pinal Forest Reserve, Ariz.; T. F. Meagher, supervisor of the Santa Rita and Santa Catalina Forest Reserves, Ariz.; John W. Farmer, supervisor of the Mt. Graham Forest Reserve, Ariz.; John Kerr, supervisor of the Lincoln Forest Reserve, N. Mex.; L. F. Kneipp, supervisor of the Pecos River and Jemez Forest Reserves, N. Mex.; E. F. Morrissey, supervisor of the Wichita Forest Reserve, Okla.

Other meetings are to follow.

During July and August Thomas E. Will, of the Forest Service, has been delivering a number of illustrated lectures on forest problems in Oklahoma, Indiana and Kansas.

Boston Pulp Laboratory

The Forest Service has established a laboratory at 696 East First street, Boston, Mass., for the purpose of making investigations and experiments in the manufacture of sulphite or chemical wood pulps.

There are, generally speaking, two kinds of wood pulp, mechanical and chemical, the first obtained from grinding the wood and the second from a disintegration by chemicals. Caustic soda is used to a limited degree, but by far the greater part of the chemical pulp is made through the agency of sulphurous acid and is known as sulphite wood pulp. It is relied upon as the strength-giving stock in most of the cheaper grades of paper, being used in connection with the cheaper and less strong mechanical pulp, in the proportion of three or four parts in ten.

To supply the enormous demand for the sulphite product more than 1,500,000 cords of wood are used annually. Nearly four-fifths of this amount is spruce. A rapid diminution in the supply of standing spruce and a consequent marked increase in its cost are the results of this great and growing demand. Therefore a principal object of this laboratory is to experiment on the pulp-making possibilities of other woods, with reference to obtaining: First, a pulp that will approximate spruce pulp to replace it where spruce is now used; second, other fibers that may have properties peculiarly adapted to special kinds of paper making; third, a pulp of marketable value as a by-product from the waste material from sawmill and lumbering operations.

The laboratory is conducted in connection with a model plant which has a capacity of about 65 tons of pulp a day. It is equipped with a chipper, liquor-making apparatus, digester, screen, vats, and molds for making sheets of pulp, a press, and the boiler and engine required for operating the plant.

The samples of wood used will be collected by members of the Forest Service in order that there may be no

question as to their identification. After barking, the wood will be chipped, cooked in the model digester, blown out into the blow-off pit, washed and screened. The fiber will then be formed into sheets by hand, and the water removed with a power press.

The object of the Forest Service experiments will be to make sulphite pulp in this manner from a large variety of American woods. The various fibers will be studied microscopically, and good-sized samples of the pulps will be available for distribution among the pulp and paper makers that they may judge of the usefulness of the various pulps for general or specific purposes.

Ale and Beer Stock

Forty-three manufacturers of ale and beer barrel stock have sent reports of their output during 1905 to the Forest Service. These, in connection with previous statements from the manufacturers of the packages produced from this stock, give some insight into the importance of white oak, since that wood is the only one that can be used.

The total number of staves reported is 12,578,000, and of heading 2,167,000 sets. In round numbers that means material for approximately 1,000,000 packages, or an average of 12½ staves to the package, which is about the averages number of staves in the quarter-barrel size. A set of heading means material for one complete head, which may be of one or more pieces.

The returns from the different states show that Kentucky produced by far the largest quantities of both staves and headings.

No wood other than white oak will answer for ale and beer barrel stock, nor indeed for any cooperage intended to contain alcoholic liquids. Red oak has been used for oil to a slight extent, and also for vinegar and packing-house packages. Local use in Oregon, California, and Massachusetts makes fir, spruce, and pine, respectively, permissible but by no means preferable. Gum and cypress are used for sirup, and ash is used in small quantities for pork and miscellaneous packages. The white oak used for ale and beer pack-

ages must be of the very highest grade, for, unlike most other tight cooperage stock, it is split by hand instead of being sawed. Because of this method, only the choicest trees, straight-grained and free from knots or other defects, can be used.

A more detailed report will be published later.

Success in Kiln Drying Manufacturers of red gum heading boards have been rather helpless against heavy losses from warping, molding, and checking, and, in addition, against the inconveniences of being obliged to wait for long periods of time for material to dry in the yard.

To improve these conditions, the Forest Service, in co-operation with a firm in Arkansas, undertook some experiments which show that red gum heading boards can be successfully dried green from the saw.

The details of the experiments were essentially different from other kiln-drying tests on cooperage stock, and the kiln itself was of a type that had never been used on such material. The kiln consists of a chamber 80 by 20 feet, the front part of which can be partitioned off by dropping a heavy canvas curtain. The whole kiln is made as nearly air-tight as possible, none of the heated air being allowed to escape nor any cold air to enter. The steam pipes which furnish the heat are distributed throughout the entire length of the kiln, as are also a series of condensing coils.

Condensation takes place in the upper portion of the kiln, which contains cold-water coils along one side, connected in pairs. Each pair of coils is controlled by a valve and a hot-water thermometer on the outside of the kiln, so that the temperature of the interior at any point is under complete control by the operator, and the rate of condensation can be made as rapid or as slow as desired. The circulation is created by means of those condensing coils. The currents of moist air have only to travel across the kiln to come in contact with the cold-water coils, and be freed of the moisture with

which they are saturated. The water is caught in a trough underneath the condensing coils, and passes out of the kiln through pipes.

When the boards enter the cool or wet end of the kiln, they are subjected to several hours of sweating at a temperature of 140 degrees Fahrenheit, the cold-water supply being disconnected from the first pair of condensing coils, and the canvas curtain dropped to form the sweating chamber. When the wood has been thoroughly sweated, the curtain is raised and the condensing coils are put in operation. Then evaporation and condensation take place throughout the whole kiln. The trucks are gradually moved along toward the hot or dry end of the kiln, where an average temperature of 180 degrees is maintained.

Considerable importance attaches to the piling of the heading boards upon the trucks in such a manner as to avoid molding, warping, and checking. To obviate the first difficulty, a space of not less than six or eight inches must be left between the ricks. Uneven lapping of boards either at ends or sides is sure to cause warping; and cross-sticks must be used at the ends of the boards to prevent warping and checking. The boards of the upper layer, being subjected to greater heat, and ordinarily without weight to hold them in shape, should have planks or some device superimposed to put the upper course under conditions similar to those lower in the pile; otherwise the topmost boards will warp.

Although it is not the general practice the removal of the bark on the edges of the boards by means of a rosser or an old jointing knife would hasten the drying, and tend to lessen mold, in addition to economizing space and saving the heat energy of the kiln.

The results of the treatment prove its success. As before stated, the boards were put into the kiln just as they came green from the saw. They were in the kiln from six to seven days, and when taken out they were

found to be dry, free from mold, and practically without checks. Under other methods of drying at the same plant, 31 per cent of red gum heading boards had been warped; but in these experiments the warpage was decreased to 14 per cent, and with one truck load only 8 per cent of the boards was warped.

Mine Timbers

The following statistics on the timber used in the anthracite coal mines of Pennsylvania are compiled from the reports of the mine operators to the Forest Service and the Geological Survey.

Reports were received from 216 collieries, producing approximately 83 per cent of the total anthracite tonnage of the United States. Figures for the remaining 17 per cent were computed, using as a basis the reports actually received, assuming that conditions and requirements were uniform throughout the state.

The results of the tabulations show that 121,565,000 feet board measure of sawed timber (equivalent to 10,130,000 cubic feet) and 52,440,000 cubic feet of round timber were used during 1905.

The total value of the sawed timber was \$1,842,000, or \$15 per thousand feet board measure. The total value of the round timber was nearly double that of the sawed timber, being \$3,468,000, or \$6.60 per 100 solid cubic feet—the approximate equivalent of the average standard cord of 128 cubic feet. The total value of the round and sawed timber combined was \$5,310,000, or about 8½ cents per long ton of coal mined, using as a basis for the calculation the production in 1905—in round numbers 61,000,000 long tons.

So far as reported, the kinds of wood have been tabulated separately, but in many cases the operators were unable to furnish information in regard to the quantity of each species used, and it has therefore been neces-

sary to classify a large amount as "mixed" or "miscellaneous."

Round Timber.

KIND	Cubic Feet
Yellow Pine	9,250,000
Oak	6,220,000
Hemlock	1,180,000
Pitch Pine	590,000
Chestnut	444,000
Beech	236,000
Jack Pine	165,000
Spruce	115,000
Mixed Hardwoods	10,263,000
Mixed Softwoods	477,000
Miscellaneous	23,500,000
Total	52,440,000

could be separated into species, and it is not improbable that oak would then displace yellow pine in rank.

Sawed Timber.

KIND	Board Feet
Hemlock	63,600,000
Yellow Pine	14,200,000
Oak	2,860,000
Maple	1,740,000
Spruce	371,000
White Pine	328,000
Pitch Pine	84,000
Mixed Hardwoods	28,642,000
Mixed Softwoods	1,370,000
Miscellaneous	8,370,000
Total	121,565,000

Of the species used for round timber, yellow pine, of which a large amount is loblolly pine from the South, furnishes one-half. Oak ranks next, but furnishes a much smaller proportion according to the reports. The oak would unquestionably be increased if the large items reported as "mixed hardwoods" and "miscellaneous"

For sawed timber hemlock holds first place in quantity, while yellow pine ranks next. The amount of oak reported is doubtless too small, but an explanation is found in the classification for "mixed hardwoods" and "miscellaneous," which contains over 37,000,000 feet board measure, of which probably a large amount is oak.

WOODLOT THINNING

Description of Work Done at Michigan Agricultural College

BY

PROFESSOR E. E. BOGUE

ONE of the woodlots on the Michigan Agricultural College farm contains seventy-seven acres. Ten years ago ten acres of this piece were cut over and all of the trees large enough for wood were taken out. It has been allowed to grow undisturbed. In May of the present year a class of forestry students thinned seven-tenths of an acre of this cut-over land. The accompanying illustration shows the students at work.

An accurate record was kept of the number and size of each species cut. The table here presented shows the twenty species found growing on the

plat arranged from left to right in order of occurrence on the area. The plat selected was considered to be a fair average. It was necessary to leave some specimens of the less desirable species, such as maple, in order to have sufficient shade to keep out grass. It will be noticed that a few small specimens of undesirable species were found in the last count. This comes about from their having been over-looked when cutting.

Based on this fraction of an acre calculation is made as to the number of each species per acre and the whole number, which is 5,562. This num-

Diameter in breast high	Soft Maple	Beech	Hard Maple	Ironwood	Dogwood	Black Cherry	Sassafras	Whitehazel	Basswood	Red Oak	Blue Beech	Juneberry	White Oak	Bitternut	White Ash	Whitewood	Hickory	Elm	Thornapple	Poplar	Totals	Cut Left	Diameter in breast high
1	341 12	319 15	183 4	159 1	139 1	9 16	15	103	7 2	10 36	20 3	8 23	3 1	3 10	4 2	1 3	1 3	2 2		4	1338 61	Cut Left	1
1 1/2	316 15	122 29	188 29	124 33	82 19	21 9	34 39	24 1	15 3	10 8	25 12	3 10	1 3	23 7	1 2	3 2	2 4	2 2		1	1008 129	Cut Left	1 1/2
2	119 19	29 23	29 26	33 16	9 16	39 7	39 65	1 2	3 4	6 5	12 3	10 8	7 14	2 6	2 10	2 2	4 3	2 3		1	303 110	Cut Left	2
2 1/2	83 20	23 7	8 10	8 4	1 1	28 30	2 2	1 1	7 10	18 9	3 3	8 5	1 1	6 5	10 2	2 2	3 3	3 3		1	259 127	Cut Left	2 1/2
3	34 18	7 7	2 6	2 2	1 18	1 22	31 31	2 2	4 3	6 6	1 1	3 7	2 5	1 5	7 6	1 1	1 1	2 1		102 91	Cut Left	3	
3 1/2	6 6	2 6	1 1	1 1	2 7	3 1	8 8	3 2	3 2	3 3	3 3	3 3	4 4	2 2	4 2	2 1	1 1	1 1		16 33	Cut Left	3 1/2	
4	6 7	3 3	2 6	3 3	12 8	3 3	8 8	1 2	8 1	1 1	1 1	3 3	2 2	2 2	1 3	3 3	1 1	3 3		31 39	Cut Left	4	
5	1 9	1 1	1 3	5 5	4 5	5 5	4 4	5 5	5 5	1 1	1 1	1 1	2 2	2 2	1 1	1 1	1 1	1 1		16 28	Cut Left	5	
6			1 3	2 2	1 7	7 7	2 2	2 2	2 2			1 1	1 1	1 1	1 1	1 1			3 14	Cut Left	6		
7	2 2			1 1		2 2													3 4	Cut Left	7		
10	Left								1												1 Left	10	
Average Dia- meter in inches	1 68	.88	1.14	1.03	1.20	1.88	1.96	.77	2.35	1.65	.95	1.17	1.68	2.04	2.12	3.73	1.45	1.89	1.33	2.88	1.35		
Total Cut	937	513	446	350	294	47	227	129	37	8	81	81	5	5	3	1	11	9	6	2	3172	Cut Left	
Grand Total	1072	618	478	558	296	253	234	129	99	93	81	81	76	55	33	11	11	9	6	4	3896		
Tot. per acre,	1531	740	683	511	421	361	334	184	141	133	115	115	108	79	47	16	16	13	8	6	5562		

ber is much larger than is usually found in woodlots, especially those that have been pastured and those where the trees are older. In this piece of timber grape vines and bitter-sweet have hindered the growth considerably by climbing up and shading undergrowth. Many of these had been cut years previous and the few that were over-looked at that time showed what might have been the condition at the time of thinning.

At the rate this work was done it would take a man six days to thin one

By taking the total per acre of the eight valuable species black cherry, basswood, red oak, white oak, bitter-nut, white ash, hickory, and white-wood, we have a total of 901 trees or a stand, if evenly distributed, where the trees would be between six and seven feet apart each way.

The average diameter for each species and for all was calculated. Arranged from greatest to least, the species have the following rank and average diameter:

Whitewood 3.73.



Forestry Students Thinning a Woodlot at Michigan Agricultural College

acre, but a man accustomed to physical labor and the use of the ax ought to thin an acre of this timber in two or three days. Old stands of timber where a large percent of the small stuff has been smothered out could be thinned much more rapidly. This thinning might better have been done five years ago, for then the trees to be saved would have been produced. Some of these now are too tall and slender to stand erect when those around them have been removed.

Poplar 2.88.
 Basswood 2.35.
 White ash 2.12.
 Bitternut 2.12.
 Sassafras 1.96.
 Elm 1.89.
 Black cherry 1.88.
 White oak 1.68.
 Soft maple 1.68.
 Red oak 1.65.
 Hickory 1.45.
 Thorn apple 1.33.
 Dogwood 1.20.

Juneberry 1.17.
 Hard maple 1.14.
 Ironwood 1.03.
 Blue beech .95.
 Beech .88.
 Witch hazel .77.
 Average 1.35.

The number of trees in this investigation is not sufficient to make far-reaching conclusions, but they are indicative and are in accord with what one who has given the subject study

might expect. It is doubtless true that the first twelve species named were largely produced as coppice.

The list shows that sassafras, soft maple, and all in the list after hickory, should be cut out and their place given to better species. Elm is questionable because of the low price at which the timber sells as compared with other timber and the habit the tree has of branching low and forming injurious crotches. The wood from the thinning pays the cost of the work.

PUMPING WATER

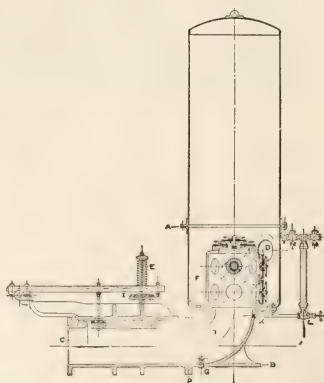
Economic Methods of Lifting Water for Irrigation by Hydraulic Rams

FOR that class of irrigation problems which presents the conditions of a moderate fall of water available for power, and where it is required to raise a portion of the water to a higher level, or even to a series of higher levels, there is no more efficient or appropriate machine for pumping than the Rife Hydraulic Ram. This statement is true for cases where the water fall is from 2 to 50 feet, and the Rams will deliver, approximately, $\frac{1}{3}$ of the water used $2\frac{1}{2}$ times as high as the fall, 1-6 five times, 1-12 ten times, etc.

A Rife Hydraulic Ram will pump with good efficiency against heads of 25 to 30 times the amount of the fall. It is true the efficiency falls off as the ratio between the power head and pumping head increases. At a low ratio of about three to one a Rife Ram will have an efficiency of over 90 per cent, whereas at a ratio of twelve to fifteen to one the efficiency will be as high as 70 per cent; and with extreme ratios of power head to force head the efficiency need not fall below 60 per cent.

The general impression of an hydraulic ram is that of the small machine usually used for the supply of a

small country house where there is a flow of water available for power of, say, 4' to 50 gallons per minute and the water used very wastefully, but there is another side to the ram question, as the principle of the machine is such that it permits the highest efficiencies, and when rams are built on the line of good hydraulic engineering, high efficiencies may be easily realized.



No. 120 Single. Capacity 750 G.P.M.
Weight 3300 pounds

Fig. 1. Cross Section of Hydraulic Ram

There is also practically no limit to the size to which the Rife hydraulic ram may be constructed. Accounts of many tests with Rife hydraulic rams have been published from time to time in the engineering press of recent years, and, in comparison with other forms of pumping machinery, the ram possesses marked advantages, and it is entirely automatic and runs constantly without attention or expense. It is practically without wearing parts, such as require lubrication or frequent adjustments, and is therefore not in need of the care of an attendant. The operation is most reliable, and the repairs are few, owing to the small number of parts which are liable to derangement; it need not be protected from the weather and will work equally well out of doors and not covered, and foundations are unnecessary.

The illustrations show one of the larger sizes of the modern hydraulic rams as built for the United States Government, and also the method of installation at the Naval Coaling station in Bradford, R. I. Two of these

machines were put in during the summer of 1903 for pumping water into a tank which furnishes fire protection, and also supplies the various buildings on the grounds and the vessels which tie up to the dock. Careful tests were made of the plant when completed by Government engineers, and the rams were shown to develop an average efficiency of 90 per cent as per Government test as follows:

**TWO GOVERNMENT TESTS ON NO. 120
HYDRAULIC ENGINES AT U.S. NAVAL
COALING STATION, NARRAGANSETT
BAY, NEWPORT, R. I.**

Q Total water used by ram.

q Water delivered into stand pipes.

H Power head on ram.

h Pumping head on ram.

Q 582 gallons per minute.

q 232 gallons per minute.

H $36\frac{3}{4}$ feet.

h 84 feet.

Strokes 130. Efficiency 91.25 per cent.

Q 578 gallons per minute.

q 228 gallons per minute.

H $37\frac{1}{4}$ feet.

h 84 feet.

Strokes 130. Efficiency 89.06 per cent.

These rams could use 750 gallons per minute each. .582 was all available when tests were made.

A number of such machines have been supplied by the Rife Engine Company, New York city, for irrigation purposes in the South and West, and also to sugar plantations in South America and the Hawaiian Islands.

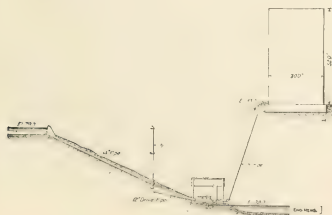
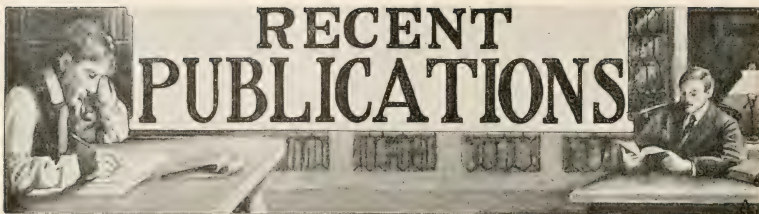


Fig. 2. Hydraulic Ram Connections. U. S. Coaling Station, Narragansett Bay, R. I.





Cotton. Its Cultivation, Marketing Manufacture and the Problems of the Cotton World. By Charles William Burkett and Clarence Hamilton Poe, Pp. 331; Illustrated with many half-tones. Price \$2 net. Doubleday, Page & Co.

In calling attention to the undoubted value of this book the reviewer cannot do better than quote its introductory paragraph:

"Cotton—what a royal plant it is!" Henry Grady once exclaimed. "The world waits in attendance on its growth; the shower that falls whispering on its leaves is heard around the earth; the sun that shines on it is tempered by the prayers of all the people; the frost that chills it and the dew that descends from the stars are noted, and the trespass of a little worm on its green leaf is more to England than the advance of the Russian army on her Asian outposts. It is gold from the instant it puts forth its tiny shoot. Its fibre is current in every bank, and when, loosing its fleeces to the sun, it floats a sunny banner that glorifies the fields of the humble farmer, that man is enthralled under a flag that will compel the allegiance of the world and wring a subsidy from every nation on earth."

To this the authors add:

"And in this flight of eloquence the Georgia orator did not overestimate the importance of the South's great staple crop. We do not exaggerate when we claim that no other plant in all the vegetable kingdom is of so much importance to the human race. Destroy any fruit plant in the world, and the men will grow other fruits. Let a lumber tree become extinct tomorrow, and other trees will take its place and our building go on as before. Even if corn or wheat or rice should perish from the earth, we could grow enough of the other crops, supplemented by rice, oats, barley, rye, peas, beans, etc., to feed both man and beast with comfort. But there is no substitute for cotton that can be cultivated on a large scale; no substitute, animal or vegetable product, with which civilization's present demand for clothing could be supplied.

"Nor is there any other plant with a history more marvelous or more romantic—more suggestive of the legend and mythology of its Oriental home, where it first began to serve mankind. If Frank Norris had lived in the South instead of California, what an Epic of the Cotton he might have given us—what a story of cotton, responding only to the warmth of a Southern sun and yielding a richer fleece than ever Jason dreamed of; Cotton, whose influence did most to bring us an alien race from Africa, and then did most to perpetuate in America the institution of human slavery; Cotton, on which a 'Dixie Land, the Land of Cotton,' once built its hopes while it waged one of the greatest wars of modern times; Cotton, which helped the vanquished people to their feet again, and now bids fair to restore them to a proud position in wealth and industry!"

The foregoing paragraphs breathe the glory of cotton, and the three hundred and more pages that follow tell, better than has been told before, of the raising and manufacturing the product of this wonderful plant. Professor Burkett and Mr. Poe had a splendid subject and they have produced a book in keeping with it. Anyone desiring an authoritative volume on the great cotton industry should not fail to secure this one.

The Packers, The Private Car Lines and the People. By J. Ogden Armour, Pp. 380; illustrated. Henry Altemus Co., Philadelphia.

Mr. Armour's book is made up of a series of articles that appeared first in the *Saturday Evening Post*. These papers break a "corporation silence," as he says, because unfair and even malicious attacks have been made by professional agitators and yellow magazines, upon the industry in which he has such a prominent part.

There is no doubt that packing house evils have been greatly exaggerated in certain directions recently, but that sweeping reforms were needed no one is now ignorant. It would have been much better for Mr. Armour and the great industry he represents if the "corporation silence" had been

broken sooner and the brazen indifference to public opinion set aside for once. There may be much that can be said for his side of the question, but he strikes the public at a time when it will not listen. There were days when "the public be damned" policy of corporations would work through letting the matter at issue die a natural death. But now the people insist on action, and in the case of the packers it was prompt and drastic. Their discomfiture contains a mighty valuable lesson for other large corporations—if they will not refuse to see it. Meantime we repeat that Mr. Armour's book, in the light of recent disclosures, is too late to entitle it to serious consideration.

Philippine Journal of Science. Vol. I, No. 4. Edited by Paul C. Freer, M. D., Ph. D., Bureau of Science, Manila, P. I.

This excellent scientific journal for May contains an exhaustive account of "The Vegetation of the Lamao Forest Reserve," by H. N. Whitford. Accompanying the text are twenty-seven full page plates that add much to the value of the article. Anyone interested in the trees of the Philippines should read Mr. Whitford's paper.

The Phantom of the Poles. By William Reed. Illustrated, Pp. 283. Price, \$1.50. Walter S. Rockey Co., New York.

The author of this volume offers the unique theory that the earth is hollow, and that the poles so long sought after are but phantoms. He maintains that there are openings at the two extremities, North and South. He even offers illustrations showing the earth's interior. Taken altogether the volume may possibly be considered interesting romance by some and not worth while by others.

The State Engineer and His Relation to Irrigation. R. P. Teele, U. S. Department of Agriculture, Office of Experiment Stations, Bulletin 168; Pp. 99.

In this bulletin the duties of the State Engineer, an officer peculiar to the arid states, is very fully discussed. It takes up in order the various states which have now or have had a state engineer, including Wyoming, Nebraska, Idaho, Utah, Nevada, Montana, North Dakota, Oregon, and South Dakota. Mr. Teele discusses the definition of rights, their acquirement, the distribution of water, fees and other matters relating to irrigation practice. Altogether it presents a very comprehensive view of the irrigation situation in the States named.

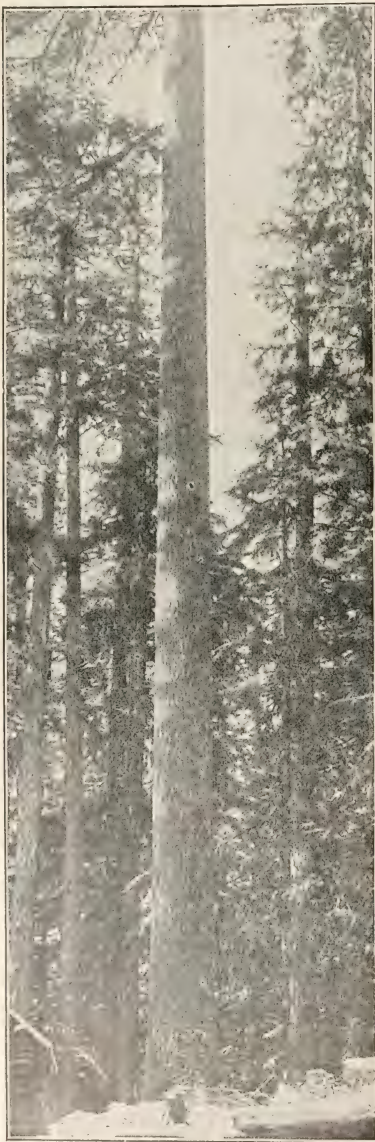
The Western Pine—Destroying Bark-beetle. By J. L. Webb, special field agent, forest insect investigations, Bureau of Entomology, Bulletin 58, Part II. Illustrated; Pp. 30. Washington, D. C.

This bulletin contains the results of investigations made in central Idaho in 1905. It shows that if neglected and conditions are favorable this beetle is capable of destroying forests over a larger area. Its habits are described and remedies suggested for its control.

Ficus Elastica. By E. M. Coventry, deputy conservator of forests, Calcutta, India. Illustrated, Pp. 35.

This bulletin treats of the natural growth and artificial propagation of the *Ficus Elastica*, along with a description of the method of tapping the tree and of the preparation of rubber for the market. Personal observation as well as the literature of the subject have been the basis of this bulletin.





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WASHINGTON, D. C.

Forestry and Irrigation

H. M. SUTER, Editor

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Original Forest, Southern Appalachian Mountains, in the Region of the Proposed
National Forest Reserve.]



VOL. XII.

SEPTEMBER, 1906.

No. 9

NEWS AND NOTES

New Secretary

On September 1 Dr. Thomas E. Will was installed as secretary of the American Forestry Association, succeeding H. M. Suter. Mr. Suter, owing to pressure of personal business found it impossible to devote his time fully to the Association work, and some time ago notified the Directors of his wish to retire as soon as they were able to select a successor.

Dr. Will has spent much time in teaching, lecturing, writing, and administrative work. In 1880, having prepared himself largely by private study, he began teaching in a country school in Woodford county, Illinois, continuing here two years. In the fall of 1882 he entered the Illinois State Normal University, graduating in 1885. From 1885 to 1888 he was occupied in the schools of Illinois, the last two years as principal of the Edwards Grammar School, Springfield, Ill., and as an instructor in teachers' institutes. The years of 1888-'91 he spent in the University of Michigan and Harvard, graduating from the latter in 1890. He was thereupon appointed Henry Lee Fellow and assistant in political

economy, in which capacity he continued one year. At the end of this year he resumed teaching, this time as professor of history and political science in Lawrence University, Appleton, Wis. Here he continued two years. The following year, 1893-4, he lectured and wrote in Boston. In 1894 he was elected professor of political economy in the Kansas State Agricultural College, where he continued five years, three as professor, and two as president. 1900 was spent largely in lecturing, writing, and magazine work in Chicago. The two and a half years succeeding were spent in Ruskin College, Trenton, Mo., as professor of social science, and the next two years in Wichita, Kans., as lecturer and writer. In July, 1905, Professor Will entered the Civil Service at Washington in the Bureau of the Census. He was soon transferred, however, to the editorial division of the Forest Service and, on September 1, entered upon the work of secretary of the American Forestry Association. During the past summer he has lectured under the auspices of the Forest Service on forestry in North Carolina, Indiana, Missouri, Oklahoma, and Kansas.

West and Forest Reserves

That Senator Heyburn struck a discordant note in his speech at the Irrigation Congress in which he bitterly assailed the forest policy of the Government, is quite evident from the tone of the press in his own section of the country. The general attitude of the West in the matter is well summed up in the following editorial from the *Denver Republican*:

"There was no justification for the vehement attack which Senator Heyburn made upon the forestry policy of the National Government in the address delivered by him before the Irrigation Congress now in session in Boise, Idaho.

"The policy of to-day differs radically from that of only a few years ago, when the reservations were under care of the Department of the Interior and on proper understanding of forestry existed among the officials of that department. At that time the reservations were managed with but little regard for the immediate needs and interests of the public. The whole thought seemed to be to keep the public out, as though that were the most effectual way to promote forest growth or to prevent the destruction of valuable timber.

"A wiser policy has been inaugurated. The forest reserves are managed now with direct reference to the benefits to flow from them to the ple of this day and generation. The pasturage within their limits is utilized by permitting grazing by both cattle and sheep. Trees of proper size are cut under direction of practical foresters, and thus the forests are made to yield a revenue in timber and lumber which helps cover the cost of maintenance and promotes the proper growth of younger trees. Where agricultural land is shown to exist within the limits of a reservation it is segregated and made subject to location and entry. Thus the settlement of the country is not interfered with by the maintenance of these reserves.

"Let any man study the forestry policy of to-day and he will give it his

hearty approval whatever may have been his views concerning the one which was followed a few years ago, but which since then has been abandoned."

Canadian Meeting

As this number of FORESTRY AND IRRIGATION goes to press a forestry convention is being held at Vancouver, British Columbia, upon the call of Lieutenant-Governor Dunsmuir, and under the joint auspices of the British Columbia Lumbermen's Association and the Canadian Forestry Association. Among those in attendance is Mr. Overton W. Price, associate forester, representing the United States Forest Service. He will make an address on the forest work our Government has in hand.

Washington Irrigation Notes

The Hazelwood Company of Spokane has completed plans to irrigate 4,000 acres of land near Spokane. The land will be cut up into 200 farms, upon which it is purposed to furnish water to farmers at a cost of not more than \$2.50 a year.

Electors in Washington will be asked to vote on two constitutional amendments next November. One of them is that the use of the waters of this State for irrigation, mining, manufacturing and for the removal of timber products shall be deemed a public use. The other is that private property may be taken under such terms, conditions and limitations as shall be prescribed by the legislature, but that just compensation must be made.

Advices from Twisp, Wash., are that the Methow Canal Company is rushing work on its big irrigation canal and that the work will be completed early the coming spring. Three thousand acres of land near Twisp will be irrigated. The flume is 138 feet above the level of the land.

The Lewiston-Sweetwater Irrigation Company is planning to furnish water for 3,000 acres of land on Lewiston flat in Idaho, south of Spokane.

The flume will be thirty miles long, the reservoir covering 200 acres.

The Spring Valley Irrigation and Canal Company has been organized to irrigate a tract of 6,400 acres in the Yakima district, south of Spokane. W. G. Chaney, of Spokane, is president.

Twenty thousand acres of land in eastern Oregon, south of Spokane, will be irrigated next year by the Umatilla Water Users' Association. The reservoir will hold 50,000 acre feet of water.

Press Clubs Pledge Aid At the recent session of the International League of Press Clubs at Denver much interest was shown in the subjects of forestry and irrigation, and the league puts itself on record in the following resolutions:

"Whereas, The subject of irrigation in the arid West is a question of vital and paramount importance in the economy of this country; and,

"Whereas, It is only by the preservation of the forests that the watersheds and streams may be perpetuated and the water conserved for public use; therefore be it

"Resolved, That this sixteenth session of the International League of Press Clubs in Denver assembled, does hereby send greetings to the fourth National Irrigation congress at Boise, Idaho, to express our deep appreciation of the importance of the work upon which the congress is engaged.

"We pledge ourselves that by our pens and our influence we will assist the forester of the United States in his laudible policy of preserving the forests of the country for present and future use.

"We also will use our influence toward establishing the Appalachian forest reserve."

Michigan Planting Experiment A correspondent writing to the *Southern Lumberman* tells of an interesting forest planting scheme in Michigan. Carl E. Schmidt, the millionaire leather man of Detroit, is endeavoring

to demonstrate the practicability of restoring the pine lands of Michigan. In Iosco County Mr. Schmidt took up a tract of about 2,000 acres of waste pine land that had been swept by fire and then bid in by the State for delinquent taxes. The soil is light sand, not suitable for farming; in fact, worthless, unless it could be reforested. Two years ago he bought in Wisconsin, in about the same latitude as Iosco, 10,000 white pine seedlings, 5,000 red cedar and 2,000 Carolina poplar and planted them on the 2,000 acres. Ninety-five per cent of the white pine lived and are now growing vigorously, 9 per cent of the cedar took root and are thriving, and 100 per cent of the poplar are doing finely. Mr. Schmidt feels satisfied now that the venture has passed the experimental stage. According to Mr. Schmidt, an average of one factory dependent upon lumber for its stock is leaving the State every week the year around.

Change of Sentiment

A significant change has taken place in the attitude of the people of the West toward the Reclamation Service. When the work began four years ago there was heard on all sides the statement that the Government should not interfere with private development, and fears were expressed that in the great works to be built the Government would in some way interfere with money making by individuals.

In one sense it has been impossible not to interfere with private enterprise, since on nearly all projects some individual or another has made filings on lands or waters and was endeavoring to sell these filings to eastern investors. The construction by the Government of a single large project, developing the country to its utmost, has frequently, in the minds of promoters at least, interfered with their smaller schemes. This condition has, however, now passed. All of the projects to be considered during the next few years have been determined upon by the Secretary, and all questions of

private rights have been practically settled by purchase or agreement. Now comes the demand for more work, and in the anxiety to extend operations the promoters have forgotten their fear that the Government would interfere with private enterprise, and are more fearful that it will not interfere in the sense that it will not buy out the various claims which are being offered for sale.

pathy from the authorities who have been endeavoring to negotiate these purchases.

Maine Forests

The system of forest protection which is being maintained through the State Land Agent's office and the large timberland owners of the State of Maine is constantly being extended and made more valuable every year by the building of new mountain ob-



Debris from Wreck of Sawmill and Log Boom on Linville River, by Floods, in Western North Carolina, in Region of Proposed National Forest Reserve

The experience of the Secretary of the Interior in buying these claims and in extinguishing the various vested rights under different projects has led to extreme caution. There is little probability that he will make any further purchases until the works now in hand are completed and are refunding money to the Treasury. The demand for a large increase to the reclamation fund does not meet with much sym-

servatories. The observatories already located on Squaw Mountain, Atean Mountain and Mount Bigelow have been the means of saving much standing timber from being devoured by fire. These stations mentioned are located where they protect the timberland around the headwaters of the Kennebec River. They have already demonstrated their value and every one of them has a record of fires dis-

covered and checked to their credit. They were started as an experiment, the first having been installed at Squaw Mountain, a few miles from Greenville, by William J. Lanigan, of Waterville, of the Hollingworth & Whitney Company, of Winslow. The system is now being extended to take in the country east and north of Moosehead Lake. To this end stations have been located on Spencer and Whitecap mountains. Spencer Mountain is about ten miles from Spencer Bay on the east shore of Moosehead Lake. The observatory is placed on the top of the mountain, which is about 3,000 feet above the sea level. The man at this station has a view of about 200,000 acres of timberland in the Moosehead and Penobscot watersheds. The station on Whitecap Mountain, which is about ten miles north of Katahdin Iron Works, was installed by J. L. Chapman, of Milo. Whitecap is not so high as some of the other mountains on which stations are located, but it rises abruptly out of a comparatively level sea of forest in the northeast corner of Bowdoin College grant and the station commands a view of some 300,000 acres of timberland on the headwaters of the Penobscot and Kennebec. This station is connected by telephone with Randall's camps at Roach Pond and from there connects with Greenville over the Moosehead Telephone Company line. Next year it is expected that the station on Whitecap will be connected by telephone with Katahdin Iron Works, from which place men can be sent to a fire located by the station quicker than they could be sent from Greenville. These mountain observatories are becoming a great factor in the protection of the Maine forests. The expense of installing the stations is not great, averaging about \$750. All the stations are equipped with the most approved range-finders and with a topographical chart of all the country that can be seen. If the man at the station sights the smoke of a forest fire on his territory he can locate the distance by means of his range-

finders, and by means of his topographical chart can tell with remarkable accuracy where the fire is. When he telephones news of his discovery to the nearest point from which men can be sent he can tell the man in charge of the fire-fighters the location of the fire so closely that little time is lost in getting to it. There is still a vast expanse of valuable timberland in the State which is not protected by one of these stations, but it seems as if the time is not far distant when every elevation commanding a view of forest country will be topped with a signal station for the discovery and location of forest fires.

Building Great Reservoir	The United States Sugar and Land com- pany of Colorado Springs, operating extensively in the Garden City, Kan., district, has just decided to construct a \$300,000 reser- voir twenty-three miles west of Gar- den City, and bids for the work will be asked at once.
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The new reservoir will be five miles long and one and one-half miles at its widest point. It will have a capacity in excess of 2,000,000,000 feet of water, and will furnish supplementary irrigation to 100,000 acres of land, the acre feet capacity being 60,000. Work will be started next month, and the reservoir completed by January 1, in time for the winter flood waters.

The fall of the Arkansas River is seven feet a mile in that region, and the ditch fall is two and one-half feet, so that the reservoir waters can easily be conducted eastward through the sugar beet lands of the company, toward the huge refinery at Garden City.

This refinery, said to be the most complete in the world, will be finished October 1, the cost being \$1,000,000. The plant will be equipped with the new Steffens process of manufacture, and its capacity will be 800 tons a day. The company has 6,400 acres of sugar beet crops, which will be ready for the plant October 1, and nearly 80,000 tons will be treated. Next year double that amount will be handled.

The United States Sugar and Land company owns 31,000 acres of land on both sides of the Arkansas River, in addition to 150 miles of main ditches and minor laterals. It will have spent upwards of \$2,000,000 when the reservoir is completed. All improvements have been made since the organization of the company in August of last year.

Hawaiian Forest Work

Mr. Charles S. Judd of Honolulu, a student of the class of 1907 in the Yale Forest School has received an appointment as special forest agent in the Division of Forestry for a temporary period during the summer.

Mr. Judd was given charge of an investigation of the planted forest on the lands of the Lihue Plantation Company and of Grove Farm at Lihue, Kauai. Careful measurements were to be made of the trees on sample areas in stands of varying age to secure data as to the growth in size and height of the trees growing thereon. The figures obtained will serve as the basis for a report on forest planting in the Territory, which it is expected will be issued during the coming year as a bulletin of the Division of Forestry. The data obtained at Lihue will permit the preparation of yield and volume tables showing what owners of land generally similar in situation, soil and aspect to that at Lihue may expect from forest plantations.

The employment of Mr. Judd to take charge of this investigation is in

line with the usage of the United States Forest Service in taking on forest school students to assist in certain of its field work.

Black Walnut

Interesting facts about the black walnut are found in the last issue of *Southwest*. Black walnut is produced in this country at an annual rate of about 33,000,000 feet. The larger portion of it now comes from southwestern Missouri, Arkansas, Oklahoma, and Indian Territory, although there is some scattering growth still picked up in Indiana, Ohio, Tennessee and West Virginia. The most considerable stand of the wood remaining east of the Mississippi River is on the upper waters of the Guyandotte River, in West Virginia, where C. C. Crane & Conmay of Cincinnati own about 20,000 trees. The home demand for black walnut lumber is only for comparatively small quantities. Its use is largely confined to gun stocks, novelties, electrical work, etc. The chief demand for walnut comes from Germany, and Hamburg is the commercial center of the market. The larger portion of the choice logs are faced on four sides and shipped to this market in that form. Specific prices cannot be supplied, because black walnut varies much in quality. The general range is from \$125 to \$150 for firsts and seconds, and about \$75 for rejects, and \$30 to \$50 for shipping culls.



PRESIDENT'S LETTER TO IRRIGATION CONGRESS

A Notable Document on Government Work in Forestry and Irrigation

TO THE OFFICERS AND MEMBERS OF
THE IRRIGATION CONGRESS,

Boise, Idaho:

Operations under the Reclamation Act, which I signed on June 17, 1902, have been carried on energetically during the four years since that date. The Reclamation Service, consisting of over 400 skilled engineers and experts in various lines, has been organized, and it is now handling the work with rapidity and effectiveness. Construction is already well advanced on twenty-three great enterprises in the arid States and Territories. Over 1,000,000 acres of land have been laid out for irrigation, and of this 200,000 acres are now under ditch; 800 miles of canals and ditches and 30,000 feet of tunnel have been completed; and 16,000,000 cubic yards of earth and 3,000,000 cubic yards of rock have been moved. Detailed topographic surveys have been extended over 10,000 square miles of country within which the reclamation work is located, and 20,000 miles of level lines have been run. Three hundred buildings, including offices and sleeping quarters for workmen, have been erected by the Reclamation Service, and about an equal number by the contractors. Over 10,000 men and about 5,000 horses are at present employed.

The period of general surveys and examinations for projects is past. Effort is now concentrated in getting the water upon a sufficient area of irrigable land in each project to put it on a revenue-producing basis. To bring all the projects to this point will require upwards of \$40,000,000, which amount, it is estimated, will be available from the receipts from the disposal of public lands for the years 1901-1908.

We may well congratulate ourselves upon the rapid progress already made, and rejoice that the infancy of the work has been safely passed. But we must not forget that there are dangers and difficulties still ahead, and that only unbroken vigilance, efficiency, integrity, and good sense will suffice to prevent disaster. There is now no question as to where the work shall be done, how it shall be done, or the precise way in which the expenditures shall be made. All that is settled. There remains, however, the critical question of how best to utilize the reclaimed lands by putting them into the hands of actual cultivators and home-makers, who will return the original outlay in annual installments paid back into the reclamation fund; the question of seeing that the lands are used for homes, and not for purposes of speculation or for the building up of large fortunes.

This question is by no means simple. It is easy to make plans and spend money. During the time when the Government is making a great investment like this, the men in charge are praised and the rapid progress is commended. But when the time comes for the Government to demand the refund of the investment under the terms of the law, then the law itself will be put to the test, and the quality of its administration will appear.

The pressing danger just now springs from the desire of nearly every man to get and hold as much land as he can, whether he can handle it profitably or not, and whether or not it is for the interest of the community that he should have it. The prosperity of the present irrigated areas came from the subdivision of the land and the consequent intensive cultivation. With

an adequate supply of water, a farm of five acres in some parts of the arid West, or of forty acres elsewhere, is as large as may be successfully tilled by one family. When, therefore, a man attempts to hold 160 acres of land completely irrigated by Government work, he is preventing others from acquiring a home, and is actually keeping down the population of the State.

Speculation in lands reclaimed by the Government must be checked at whatever cost. The object of the Reclamation Act is not to make money, but to make homes. Therefore, the requirement of the Reclamation Act that the size of the farm unit shall be limited in each region to the area which will comfortably support one family must be enforced in letter and in spirit. This does not mean that the farm unit shall be sufficient for the present family with its future grown children and grandchildren, but rather that during the ten years of payment the area assigned for each family shall be sufficient to support it. When once the farms have been fully tilled by freeholders, little danger of land monopoly will remain.

This great meeting of practical irrigators should give particular attention to this problem and others of the same kind. You should, and I doubt not that you will, give your effectual support to the officers of the Government in making the Reclamation law successful in all respects, and particularly in getting back the original investment, so that the money may be used again and again in the completion of other projects and thus in the general extension of prosperity in the West. Until it has been proved that this great investment of \$40,000,000 in irrigation made by the Government will be returning to the Treasury, it is useless to expect that the people of the country will consider direct appropriations for the work. Let us give the Reclamation Service a chance to utilize the present investment a second time before discussing such increase. I look forward with great confidence to the result.

By the side of the Reclamation Ser-

vice there has grown up another service of not less interest and value to you of the West. This is the Forest Service, which was created when the charge of the forest reserves was transferred from the Interior Department to the Department of Agriculture. The forest policy of the Administration, which the Forest Service is engaged in carrying out, is based, as I have often said, on the vigorous purpose to make every resource of the forest reserves contribute in the highest degree to the permanent prosperity of the people who depend upon them. If ever the time should come when the western forests are destroyed, there will disappear with them the prosperity of the stockman, the miner, the lumberman, and the railroads, and, most important of all, the small ranchman who cultivates his own land. I know that you are with me in the intention to preserve the timber, the water, and the grass by using them fully, but wisely and conservatively. We propose to do this through the freest and most cordial coöperation between the Government and every man who is in sympathy with this policy, the wisdom of which no man who knows the facts can for a moment doubt.

It is now less than two years since the Forest Service was established. It had a great task before it—to create or reorganize the Service on a hundred forest reserves and to ascertain and meet the very different local conditions and local needs all over the West. This task is not finished, and of course it could not have been finished in so short a time. But the work has been carried forward with energy and intelligence, and enough has been done to show how our forest policy is working out.

The result of first importance to you as irrigators is this: The Forest Service has proved that forest fires can be controlled, by controlling them. Only one-tenth of 1 per cent of the area of the forest reserves was burned over in 1905. This achievement was due both to the Forest Service and to the effective assistance of settlers and others in and near the reserves. Every-

thing the Government has ever spent upon its forest work is a small price to pay for the knowledge that the streams which make your prosperity can be and are being freed from the ever-present threat of forest fires.

The long-standing and formerly bitter differences between the stockmen and the forest officers are nearly all settled. Those which remain are in process of settlement. Hearty co-operation exists almost everywhere between the officers of the Forest Service and the local associations of stockmen, who are appointing advisory committees which are systematically consulted by the Forest Service on all questions in which they are concerned. This most satisfactory condition of mutual help will be as welcome to you as it is to the Administration and to the stockmen. To the stockmen it means more, and more certain, grass; to you, because of the better protection and wiser use of the range, it means steadier stream-flow and more water.

The sales of forest-reserve timber to settlers, miners, lumbermen, and other users are increasing very rapidly, and in that way also the reserves are successfully meeting a growing need.

Lands in the forest reserves that are more valuable for agriculture than for forest purposes are being opened to settlement and entry as fast as their agricultural character can be ascertained. There is therefore no longer excuse for saying that the reserves retard the legitimate settlement and development of the country. On the contrary, they promote and sustain that development, and they will do so in no way more powerfully than through their direct contributions to the schools and roads. Ten per cent of all the money received from the forest reserves goes to the States for the use of the counties in which the reserves lie, to be used for schools and roads. The amount of this contribution is nearly \$70,000 for the first year. It will grow steadily larger, and will form a certain and permanent source of income, which would not have been the case with the taxes whose place it takes.

Finally, a body of intelligent, practical, well-trained men, citizens of the West, is being built up—men in whose hands the public interests, including your own, are and will be safe.

All these results are good; but they have not been achieved by the Forest Service alone. On the contrary, they represent also the needs and suggestions of the people of the whole West. They embody constant changes and adjustments to meet these suggestions and needs. The forest policy of the Government in the West has now become what the West desired it to be. It is a National policy—wider than the boundaries of any State, and larger than the interests of any single industry. Of course it can not give any set of men exactly what they would choose. Undoubtedly the irrigator would often like to have less stock on his watersheds, while the stockman wants more. The lumberman would like to cut more timber, the settler and the miner would often like him to cut less. The county authorities want to see more money coming in for schools and roads, while the lumberman and stockman object to the rise in value of timber and grass. But the interests of the people as a whole are, I repeat, safe in the hands of the Forest Service.

By keeping the public forests in the public hands our forest policy substitutes the good of the whole people for the profits of the privileged few. With that result none will quarrel except the men who are losing the chance of personal profit at the public expense.

Our western forest policy is based upon meeting the wishes of the best public sentiment of the whole West. It proposes to create new reserves wherever forest lands still vacant are found in the public domain, and to give the reserves already made the highest possible usefulness to all the people. So far our promises to the people in regard to it have all been made good; and I have faith that this policy will be carried to successful completion, because I believe that the people of the West are behind it.

Sincerely, yours,

THEODORE ROOSEVELT.

FAIRBANKS ON IRRIGATION

The Vice-President of the United States
Attends the National Irrigation Congress

"Mr. President and Members of the National Irrigation Congress: It is impossible to exaggerate the importance of the work in which you are engaged. It is fraught with far-reaching interest, not only to the present but to the future. It is a subject to which I have given considerable attention during my public service, for I have been a firm believer in the feasibility of national irrigation, as now contemplated, in the arid and semi-arid regions. It will bring under cultivation large areas of the public domain which would otherwise remain sterile and practically uninhabitable.

"The rapid increase of population and the pre-emption and settlement of the arable portions of the public lands has rendered it important that we should reclaim the waste places and make them productive through a wise irrigation system which lies beyond the capacity of individual effort. This policy is in the highest degree beneficent. It not only enlarges the field of wholesome, individual opportunity, but it is in a very especial degree, of national significance. It increases the opportunity for the development of the agricultural regions of the republic, for multiplying the number of American farms and American homes, thereby augmenting the great conservative forces which are the surest reliance and safeguard of our political institutions. I firmly believe that the most conservative elements will always be found upon the farm. You will generally find among the millions throughout the great agricultural regions less tendency than elsewhere to inconsiderate and hysterical judgment.

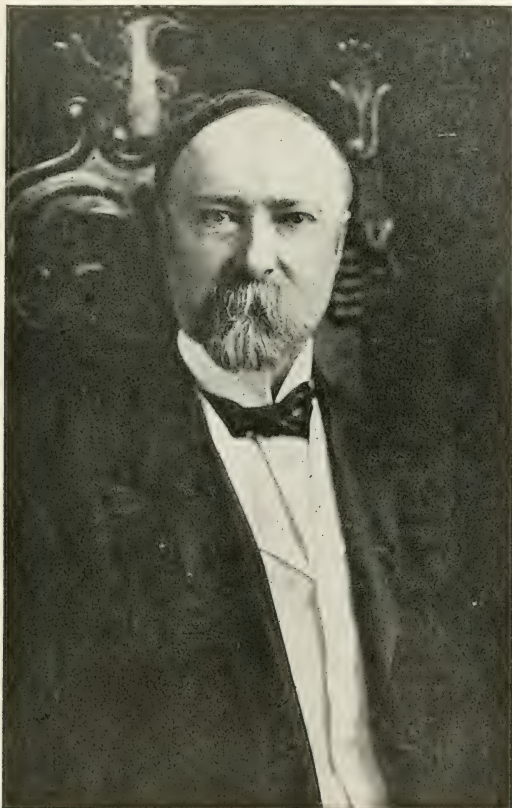
"The general subject which is under consideration is one of those great practical, everyday questions which requires the application of good busi-

ness sense. The real benefactor, we understand, is the one who makes two blades of grass grow where one grew before. Those who have been engaged in the promotion of irrigation fall most distinctly within this definition and are benefactors of their day and kind. They have the satisfaction of knowing that they have in a measure promoted the interest and welfare of the home-makers. The home-builders of America have been and are as a rule, a hardy people, in love with nature and enamored of their institutions. They have thus far overcome many of the seemingly impossible obstacles of nature in the great arid and semi-arid regions, and have erected their habitation and made prosperous and happy neighborhoods. They are entitled to all success in their beneficent enterprise. Some of our wisest statesmen, of a not very remote past, had but little conception of the possibilities which many of you have opened up to our country and our civilization. We may well believe that, with our larger experience and greater light, we have as inadequate a conception of the vast possibilities of this western section of the country, as many of our predecessors had of the large development which has already been accomplished. The growth of irrigation thus far is largely due to individual and corporate enterprise. It has been carried on by our people for many years in a more or less satisfactory way, but it has not been until recently the subject of national consideration. No one can appreciate the magnitude and the possibilities of the reclamation service in which the national government is engaged and which you are met to encourage, who has not looked upon what irrigation has already accomplished. Go

into the valleys of Arizona, California, Colorado, Idaho, Montana, New Mexico, Nevada, Oregon, Utah, Washington, Wyoming, and so on, and some conception can be gained of the wondrous possibilities of the future by what has already been done. Fruits, vegetables, grains and

valueless and beyond the hope of cultivation. I have observed in many places, to employ the language of Whittier,

* * * orchards sweep
Apple and fruit trees fruited deep
Fair as the garden of the Lord.
"Irrigation lands are made to yield



VICE-PRESIDENT CHARLES WARREN FAIRBANKS

Whose Address Formed an Interesting Feature of the Irrigation Congress

grasses of almost every variety are produced in profusion upon lands which but a few years ago seemed to the casual observer absolutely

manyfold more than the best unirrigated lands and the certainty of good crops seems to be assured. There is a guaranty against the

blighting effects of drouth, and the intelligent husbandman is certain of a bountiful yield as the fruit of his industry. The desert is fast disappearing before the magic touch of American genius, thrift and pluck. What, a few years ago seemed to be impossible, is now being accomplished. It has been demonstrated that there is no investment which has yielded better or surer results than money spent in the construction of feasible irrigation works. It is estimated that some ten millions of acres are now irrigated through individual and corporate effort and that the value of our agricultural products has been thereby increased in the sum of more than an hundred and fifty millions of dollars per annum. It is also estimated that this annual increase is in excess of the total cost of irrigation works through which it is made possible.

"When we consider, in addition to the large money value of the increased annual yield through irrigation, the many incidental benefits resulting from, the magnitude and importance of the subject of national irrigation can be more fully appreciated.

"The government has not entered upon the subject of irrigation hastily and without the utmost consideration. The matter has been thoroughly debated and considered in its physical and economic aspects. When it was first suggested it was regarded by those who had given it only a superficial consideration, as impracticable and as involving a tremendous and unnecessary drain upon the national treasury. The fact was that individual and corporate enterprises had carried the work forward as far as it could reasonably do so. The larger and more difficult propositions awaited the action of the national government.

"The existing irrigation law was put upon the statute books in 1902. The law is founded upon an entirely rational and defensible theory. It is entirely just and equitable. None

better has been enacted by the congress of the United States in recent years.

"It provides substantially that the money arising from the sale of public lands shall be set apart in a special fund, to be used exclusively for irrigation purposes. The money so derived is to be expended in the establishment and construction of irrigation works and is to become a charge upon the land benefited, and is to be repaid to the government by the land owner in not more than 10 annual payments. It is returned to the reclamation fund and is to be again used in the inauguration and development of new irrigation projects. In short, the fund becomes an endless chain extending its blessings to future years. Not a dollar comes out of the pockets of the taxpayers of the country to promote this great work. It is estimated that the amount to the credit of the reclamation service at the close of the fiscal year, 1908 will be \$41,441,572.95.

"Irrigation by the national government has been undertaken so recently that its beneficent results have not yet been felt. The Secretary of the Interior has authorized the construction of many projects in the states of California, Idaho, Colorado, Kansas, Montana, Nebraska, Nevada, North Dakota, Oregon, South Dakota, Utah, Washington and Wyoming and in the territories of Arizona, New Mexico and Oklahoma.

"The first allotment for such construction is about \$41,441,572.95, and when this expenditure is made, it will bring under irrigation nearly 1,200,000 acres. It will be observed that the cost of the work now authorized is equivalent to the estimated amount of the reclamation fund in 1908. This will not, however, complete the work. It will require some sixty millions of dollars, in addition, to finish the projects now undertaken, and when they are completed, the total amount of land irrigated will be 3,200,000 acres.

"The Secretary of the Interior has under consideration additional projects in Arizona, California, Colorado, Idaho, Montana, New Mexico,

Nevada, Oklahoma, Oregon, Utah, Washington and Wyoming, which will cost about \$109,000,000, and which, when completed, will bring

Field of Sugar Beets in California Raised by Irrigation



under irrigation 3,070,000 acres. It will thus be seen that when the government completes the work it will render arable nearly 6,300,000 acres, at a cost of a little more than \$200,000,000.

"To prosecute the work which it has undertaken and which lies before it, the government will have in hand, as heretofore observed, nearly forty-one and a half million dollars in 1908, an amount sufficient to cover the first unit of cost of projects authorized, and for thereafter prosecuting the work it will have the proceeds derived from the future sales of the public domain and the return from the land theretofore irrigated.

"It was the purpose of the author of the reclamation act that irrigation undertaken by the national government should not be entered upon for the benefit of mere speculators. It was their purpose that the public domain and the proceeds arising from its sale, should be appropriated absolutely and entirely for the benefit of homeseekers. The law wisely provides that the limit of area per entry upon the lands irrigable shall be restricted to what would be reasonably required for the support of a family. In order that the entryman may enjoy the benefit of the law, actual and continued residence on the land is required.

"It is obviously the purpose of the great measure, and it is one of its most commendable features, to insure homes to the greatest number of persons, and to bring soil now sterile under a high state of cultivation and productiveness for their benefit and for the benefit of the entire country.

"I believe that irrigation is only in the preliminary stages of its development in the United States. Much has been done, it is true. There is, however, a vast deal more to be accomplished. There are many millions of acres still lying within the arid and semi-arid regions which are non-productive, and which may, in due time, be irrigated. This area is

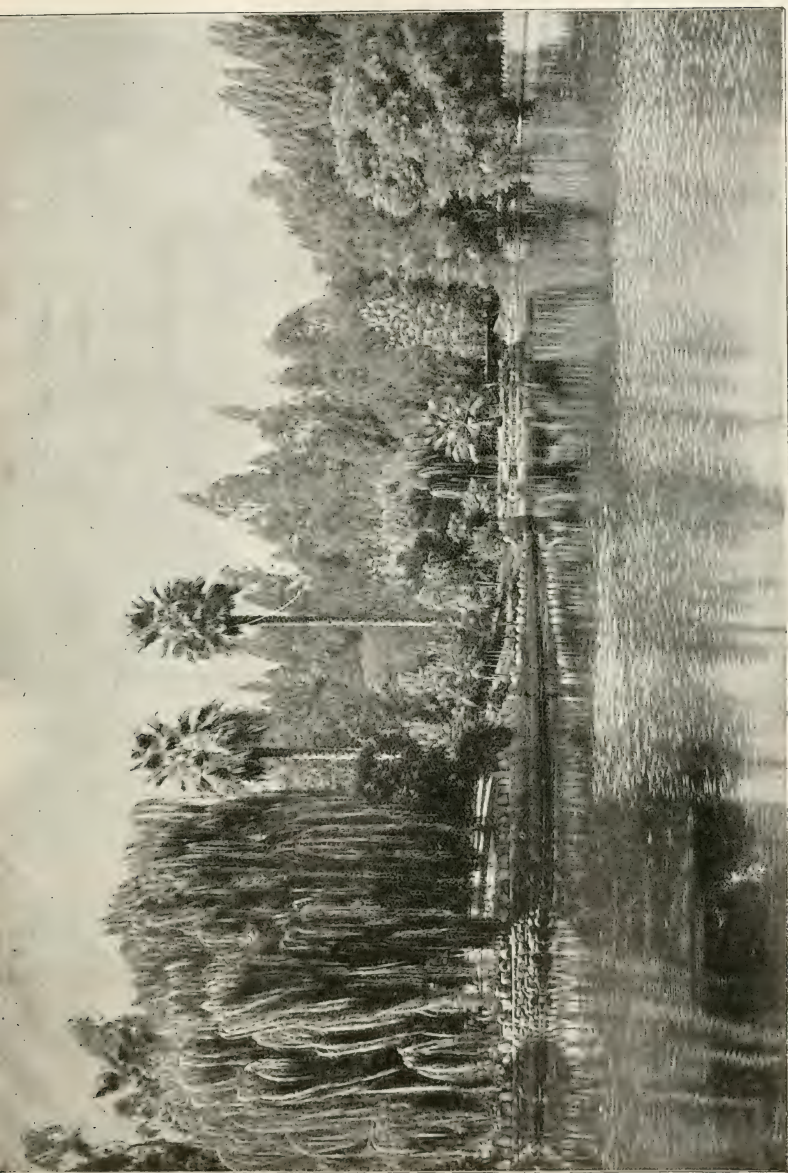
of indefinite extent. It is variously estimated at from fifty to one hundred millions of acres. Of course, the acreage which may be irrigated will depend in a large degree upon the quantity of water which can be stored in the great reservoir systems to be established. The best opinion would seem to indicate that it is reasonably certain that sufficient water may be obtained for irrigating at least 50,000,000 of acres. Twenty millions of acres of this tremendous area is yet a part of the public domain. When the whole is brought under cultivation by means of irrigations, the wealth of the nation will be increased \$5,000,000,000.

"This work cannot be accomplished in a day, and it will probably not be done without some mistakes. It will require time, experience, scientific skill and a large expenditure of money to do it. The field is, indeed, a vast one, and it invites our best endeavor.

"While we are concerned particularly with the extension of the irrigation service into the arid and semi-arid regions, I believe in time it will be largely increased in many other portions of the country. The waters in many of our rivers and streams, outside of the arid and semi-arid areas, will be raised and spread over many sections where crops are occasionally destroyed or reduced in yield in consequence of drouth. We can see the limit of our arable areas, but we cannot see the limit of the demand of our increasing population, nor the extent of the demand of millions in foreign countries for American food supplies.

"One of the great practical questions in the future will be how to increase and conserve the productive power of our agricultural regions. Scientific irrigation on broad lines will be a factor of increasing future importance in most of the States and Territories of the Union.

"It is important not only to promote the interests of irrigation, but there is a co-related subject which



Semi-Tropical Growth Through Irrigation in Southern California

is worthy of consideration, and that is—How shall we reinforce and maintain at its highest efficiency the productive power of the soil? Farming is fast becoming a science and the most successful farmer is the one who understands the chemistry

of the soil and the products for which it is best suited. We are making marvelous progress in every department of our domestic economy and nowhere is our advancement more marked than in the great field of agriculture."

FORESTRY AND LANDSCAPE ARCHITECTURE

BY

SAMUEL CABOT, JR.

THE interdependence of forestry and irrigation, and forestry and lumbering have been much discussed, but few people seem to realize the important bearing which forestry and landscape architecture have on each other. It is true that many ignorant of the real situation in this country, have advocated the protection of our forests for purely æsthetic and sentimental reasons. The practical forester on the other hand, disgusted perhaps by the outcry of these individuals, has gone somewhat to the other extreme and has tended to make his aim the most efficient production of timber rather than the most "wise use of forests."

Woodland is the most important feature in natural scenery capable of human control and is therefore the most useful material the landscape architect has to work with in informal landscape design. Woodland again is obviously the means, the aim, and the end of forestry. It would be, then, extraordinary if two professions working largely in the same material, should not each cover some part of the province of the other, that is, if forestry (i. e., "The wise use of forests") would not be "wise" in employing landscape architecture, and vice versa.

COMMERCIAL VALUE OF ATTRACTIVE LANDSCAPE.

In the Eastern part of our country real estate is high and forest land divided up largely among small owners. There is also much demand for beautiful sites for spring, summer, and autumn residences. These, however, only anticipate conditions that will be true eventually in other parts of the country. People are constantly buying land for residences, farms and woodlots at many times their value as crop or timber producers. Here is where the farseeing forester should do what he can to enhance the beauty of the land in his charge and raise its value as a house site. Is there a beautiful view from the place? Do not let it be choked with trees, but cut a vista, that the possible purchaser may realize it. Is there an attractive situation for a house backed by an imposing pine grove? Then leave the grove; it is only worth \$8 a thousand at the mill, and some millionaire may feel that he cannot live without it. There are many more possibilities of this kind. I know of several instances where well-placed pine groves and, in one case, a single tree, have determined building sites. Many times a clump of stately trees, conspicuously placed, covering, per-

haps, half an acre of land, has attracted a purchaser for a hundred acre farm. I can recall a case where lumbering operations happened to expose a delightful view, a man in a motor car happened to come along, happened to see the view and bought it on the spot. Do not make chance your real estate agent; see that your view is visible and that others know of it.

PRACTICAL FORESTRY ON PUBLIC AND PRIVATE PARKS.

Now we come to land reserved purely for recreation and beauty. There are many such in the East, either private grounds or state and metropolitan reservations. If left to themselves the trees have the usual struggle for existence; in youth an impenetrable tangle; in maturity a good forest, but strewn with dead and decaying timber uninviting and difficult, and only in old age, after a century of

struggle, a fine open forest such as we most love, but passing soon to unlovely decay. If this were treated by practical forestry the less attractive period of youth would be shortened by improvement thinnings, maturity would have the open park-line quality of old age, and old age itself be all the heartier. When ripe the old trees would be cut off after a crop of new reproduction was established. Thus the sad period of decay would be done away with and considerable revenue would be assured from the land.

I have not tried to make a plea for either the æsthetic or the practical side of the "wise use of forests," for each has plenty of ardent supporters, but have endeavored to reconcile the two which seem to me to have worked rather at cross purposes, and have attempted to suggest that neither can reach full efficiency without the help of the other.

MEETING OF PHILIPPINE FORESTERS

Annual Conference at Manila of the Insular Forest Service,
at which Many Matters of Importance were Discussed

AS HAS BEEN THE CUSTOM in the past, the Philippine Forest Service held its annual meeting, or conference, this year during the first two weeks of July or just after the beginning of the new fiscal year. The objects of this conference are to bring all the foresters together in the Manila office to discuss Philippine forest matters, to propose new laws or to amend old ones, to bring personally to the attention of the Director of Forestry any matters which are best presented verbally, and, in short, to have a general business session, at which everyone will benefit by the discussions of all others present.

At the meeting this year all the foresters, who are also the chiefs of the different forest districts, were present, together with several botanists and

representative lumbermen. The Director of Forestry, Major George P. Ahern, presided, and the following foresters made up the meetings: Mr. W. M. Maule, Mr. William Klemme, Mr. H. M. Curran, Mr. H. N. Whitford, Mr. H. D. Everett, Mr. W. I. Hutchinson, Mr. M. L. Merritt, Mr. T. C. Zschokke, Mr. John H. Bridges and Mr. Wm. H. Kobbe.

Each forester read his annual report, which contained a forest description of his district, the lumbering in his jurisdiction, and, in fact, a complete review of all forest matters occurring during the year in his particular territory. These reports were interesting, and the fact that the entire Archipelago is now divided into districts, made the reports all the more valuable. The reports from the new

forest districts were particularly interesting. The Director of Forestry asked many questions concerning each district, and the reports were thoroughly discussed by the meeting. Committees were also appointed by the Director of Forestry to devise a Philippine primer of forestry, to investigate the needs of the service as to field equipment, and to propose and discuss a forest uniform for the Insular Service.

In addition to this committee work the following subjects were discussed: "Improvement of the Forest Service;" "Work of the Foresters;" "Instruction to Rangers;" "Equipment at the Forest Station including herbarium, forest products exhibits, etc.;" "Proposed changes in laws and regulations;" "Free cutting of timber and how to regulate it;" "Improvement in logging methods and use of saws, American axes, etc."

Representatives of the Philippine Timber Cutters' Association attended several sessions of the conference of the present forest policy.

Representatives of the Bureau of Public Lands and Bureau of Internal Revenue explained to the conference points in connection with the homestead laws, land titles and the use of the new Internal Revenue forms for the appraisal of forest products and collection of forest charges.

The botanist of the Bureau of Science spoke with reference to collection and preparation of botanical material for identification.

The entire meeting may be considered a great success and a most pleasurable feature of it proved to be the banquet on the last night of the session. Everyone connected with Philippine forestry was present, and the evening was thoroughly enjoyable.

THE FUTURE FORESTS OF MINNESOTA

A Prominent Lumber Journal, "The Mississippi Valley Lumberman," Offers Valuable Practical Suggestions

AMONG the many State publications that have had more or less to say about the timber resources of this State and the manner in which they have been exploited, the *Pioneer Press* is the first to get down to a sane discussion of the subject, and propose something really practical. Most of them have been content to confine their discussions to abuse of the lumbermen for having pursued the only policy that was possible from a commercial standpoint. In the making of dollars and cents, most business men do not mix a considerable amount of philanthropy. This is not to say that the lumber manufacturers have not been philanthropic. They have been, with the money they have accumulated as a result of strict attention to business,

but they have not been in a hurry to sink money in the same line of business in which they have made it. To make the application direct, they have not gone into the business of raising forests when to do so would insure a loss—not because there might not be money in it if conditions were right, but because conditions have never been right, and these conditions have been such as they could not control. Profitable forest raising has not only not been made easy, but it has not been made possible. Laws, and the manner of their administration have prevented the application of any ideas of practical forestry.

The policy suggested by the *Pioneer Press* has been suggested many times by *The Lumberman*, though it may

not have been classified and given in whole at any one time. These measures, in brief, are something as follows: 1. State control of both public and private timber lands, and the compulsory planting of young trees to take the places of mature growth that has been cut. 2. The securing by the State of the remaining federal forests and of Government lands not suitable to agriculture. 3. Forest Service control of the Cass Lake forest reserve. 4.

and the compulsory planting of young trees—constitutes a policy that has been in force in some foreign countries for years. It should be elaborated to the extent of designating that only trees of a certain size of growth shall be cut, and that for every mature tree cut, at least one young tree shall be started. Then the State government should provide that proper care should be taken of the young trees to prevent their destruction by fire or other



**Pure Stand of Sapling Norway Pine on the Minnesota Forest Reserve
Showing the Forest Possibilities of the State**

The purchase by the State of rocky and inferior cut-over pine lands which shall be devoted to forestry. 5. Turning over the Itasca state park to the Minnesota School of Agriculture for practical forestry demonstration. 6. The enlargement and extension of the State fire warden service. 7. The exemption from taxation of all lands exclusively devoted to the growth of timber.

The first of these—the State control of public and private timber lands

causes, so that in time the tree that has been removed shall be replaced by another of commercial value. The second suggestion, that the State should procure from the Government all the remaining forest areas and low grade lands remaining under federal ownership, involves a responsibility that the State has as yet shown no disposition to assume, but which it could well afford to take. The third suggestion, that the Forest Service should control the Cass Lake reserve, might

be extended to give the Forest Service control of all lands in the State which are or shall be devoted to timber culture, at least, until the State is equipped to do as good work. The next suggestion, that the State purchase the cut-over pine lands, will require a greater amount of liberality and foresight than any State legislature has yet shown, but the suggestion is a good one, nevertheless. The State School of Agriculture is well equipped

liberality. The office of the State fire warden has been considered in the nature of a pension, rather than as a practical and valuable service to the State. This is true in spite of the excellent results shown. Because these results have been somewhat negative in character their value is not appreciated. It is known that previous to the organization of the State fire warden service there were disastrous forest fires, and that since then the loss



Reproduction of Norway Pine on an Old Burnt-Over District
Minnesota Forest Reserve.

to demonstrate the practicability of scientific forestry, and can undertake that work better than can any private individual or corporation. A concern that must show reasonable profits cannot afford to wait a century for returns. The State can.

The last two items in this proposed scheme are worthy of attention at the next session of the State Legislature. One of them has been considered before this, but the legislature has not been disposed toward even reasonable

of timber by fire has been very small. But the disposition has been to attribute this to chance rather than to give credit where credit is due. Hence the biennial appropriation for the work has been small, and the salary of the chief fire warden has been left at a figure that has permitted little but routine and office work.

The last suggestion, in regard to the taxation of timber lands, is a practical one as regards grown timber as well as the one that will probably be the

last to receive due consideration. In Michigan, in Wisconsin and in Minnesota, timber owners have been fine picking for county tax boards, and in these and other States the removal of the timber has been accelerated by the short-sighted policy of confiscatory assessments. The dead goose has outweighed in value the golden eggs. Even the recent rapid appreciation in

too small to stand a regular tax levy. A tree that is only worth three or four dollars when it is a hundred years old will not assist materially in building up county finances while it is a sapling. But even absolute exemption from taxation will hardly attract private capital to timber raising in this State. The growth of northern pine is too slow. Other classes of timber in other



Pure Stand of Sapling White Pine on the "Ten Sections," Minnesota Forest Reserve

the value of standing timber could not have stood the strain of the excessive taxation that has ruled in most localities, and if this is true of timber that has reached its commercial growth, how much encouragement has there been to the raising of timber from the young trees. The annual increase of growth in a tree that requires seventy-five or one hundred years to become valuable for lumber is much

parts of the country show rapid enough growth to warrant practical forestry where a large enough area can be had. In this part of the country lumbermen will leave forest raising to the State or Federal Government. Thus, with the exception of the last, every one of these suggestions are practical, and if Minnesota is to have any standing timber fifty years hence, every one of them will have to be adopted and enforced.

SOME POPULAR MISCONCEPTIONS CONCERNING FORESTRY

How They May Be Rectified and Turned
to the Advantage of the Forest Movement

BY

LESLIE HARRISON

PERSONS familiar with the true significance of the forest movement in the United States have frequently been amused and sometimes disappointed at certain manifestations of popular misconceptions of the principles of forestry. It is even true that individuals and organizations, with earnest and zealous desires to foster a campaign in which they have great belief, are prone to mix extraneous notions of esthetics or sentiment to the exclusion of fundamental economic principles. The notion, at one time almost prevalent, that a forester lived in the woods and wore a suit of "Lincoln green," may be said to be wholly eradicated. Yet the sentimental ideals are far from dead, and may be summed up in the oft-quoted "Woodman, spare that tree," in spite of the fact that the greater part of the effort of the trained forester is directed toward preparing his trees for the woodman's ax. This is a horrifying thought to many, who feel a revolt within their souls that a tree which has been decades or centuries in the growing may be cut down and utterly "destroyed" within a few hours. They picture in their minds the forest monarch forced to succumb to the blows of mere and puny man, devoid of poetic ideals and with no conception of the marvels of nature or the immutability of time.

There is a lack of the power to distinguish between the set of facts affecting the individual tree and the complex and very different set of facts concerning the forest, or the tree as a part of the forest. The lesson that

the United States Forest Service seeks to inculcate is that trees are for use, and all of the efforts of the service are directed, not toward hoarding the trees, but toward making them of the greatest use to the greatest number of people for the greatest possible time. There is an actual analogy between banking and forestry, in so far as the bankers and the forester alike want their wealth used, and in the use to grow in quantity and value.

Let us take two homely examples which will represent the different points of view of the beautiful and the useful, or the ideal and the real:

An old colored man was trudging through the streets of Washington with a bundle of trimmed hardwood saplings, long and straight, over his shoulder. As he went, he cried, not unmusically, "Cloe's props! Heal's yo' cloe's props!" His intent was to appraise the householders that he was vending props, whose forked ends were to be placed beneath the lines when sagged down by the weight of wet garments.

A pleasant appearing woman called to him from her doorway. With expectations of a sale he hastened toward her. When he came near enough to be within range of her voice, which proved to be earnest and vibrant, not to say militant, he heard words like these:

"See here, Uncle! What do you mean by cutting down those beautiful straight young trees? Don't you know that if you had not destroyed them they would have lived to wax strong

and tall, to furnish grateful shade for man and beast. You should have spared them to a nobler destiny than the mere plebian use of supporting dirty linen——”

“Yassum,” in open-eyed wonder.

“Now don’t interrupt! You have not the iota of a glimmering perception of the glory of the tree, the symbol of aspiration, thrusting its crown ever heavenwards——”

“But dese heah am jes’ cloe’s props, Ma’am!”

“That’s just it! Dead, inert, lifeless and leafless; doomed now to decay in the defiling and careless hands of an ignorant washer-woman; no longer to burgeon with bud and bloom, no longer to put forth their resurrection garments of green, no longer to raise their leafy boughs in supplian——”

“Yassum!” assented the old darky growing restive. “But cloe’s props ain’ nevah menat to grow no leaves.” He saw the prospects of a sale diminishing and was therefore emboldened to ask, with an air of finality, “Does yo’ all want any cloe’s props, to-day?”

“No; I do not,” answered the lady with some asperity. “I would not thus encourage the wanton destruction of the beautiful young trees. I tell you it is wrong; it is wicked, it is destructive and criminal to make clothes props of God’s green and growing things. I could not disgrace myself nor defile my backyard by buying of you and thus encourage the further devastation of——”

“Then yo’ don’ wan’ no cloe’s props, Lady? Good day Mis’!” And the old man trudged on, muttering to himself, “Well, ef dat ain’ de beatenes’?”

There was right on both sides of the clothes-prop question, yet, all things considered, the old darky was nearer to the real principles of forestry than the lady was. She was left speechless and choking with a righteous indignation at what she considered an awful crime. He, on the other hand, was, as the lady said, devoid of esthetic ideals, and had simply

seen the cash value of some saplings on outlying commons which were then being “scalped” for a new suburban subdivision. His industry had converted waste material into a money-making product. The lady exemplified one main type of misconception. Her theory, based on a sentimental concept, was correct, especially since she considered only the relation of the tree to the landscape. The vendor was, however, not far from the fundamental truth that goes with forestry, that trees are for use.

Another case in point where the sentimental and the economic points of view are at variance is found in the annual protest against the cutting of Christmas trees. Letters galore are published in leading periodicals, calling attention to a destructive vandalism in which the innocent little trees are “butchered to make a Christmas holiday.” These letters, in many instances, have a rational basis, but more often a colder and more calculating judgment sees many good reasons why Christmas trees should be cut. Here are two attitudes, diametrically opposed. The common or popular point of view sees a great wrong done. The other attitude, held by those who favor an economic use of forest products sees no more wrong in cutting trees for Christmas decorations than it does in cutting them for pulp, for fuel, or for lumber. Nor does it seem any more wrong to those who advocate the latter theory to cut a tree for Christmas than to cut a lily for Easter. Reduced to its simplest economic aspects the case is similar, and if a Christmas tree crop is valuable it should be grown for such value.

The Forest Service does not hesitate to espouse this latter view, and while it may seem only a coldly calculative one, it is not wholly lacking in sentiment, because the foresters believe that there are few uses to which small fir trees could be put which would contribute so much to the happiness and good of mankind as their use for the children on a Christmas day. Moreover, the species cut do not have any

great commercial value, and still less do the actual specimens, which are branchy, open-grown trees that would never be good timber. The lumberman does not deal in the product. The producer of Christmas trees is the farmer who culls them from waste land, and gets a return from an ordinarily worthless growth, which, in many instances is somewhat of a nuisance besides. The annual crop is estimated to be not less than 7,000,000 trees, not counting those culled from suburban commons and used in the cities near which they grow. Yet the whole effect of Christmas tree cutting is infinitesimal upon the life of the forest. It is true that there are occasions where the trees have been cut wastefully or from areas where they have some value as cover. In such cases the remedy lies, not in a prohibition of cutting, but in a wiser method. Also there is some danger that an owner of young evergreens may sell his trees for less as Christmas trees than they would bring as growing stock for a future timber supply. However, it may be taken for granted that the owner of woodland is looking out for the best possible return from that woodland, and the trees will be cut and marketed, or judiciously saved, according to the prospects of the greatest monetary return.

A great measure of the success of the Forest Service, one of the youngest and most flourishing of the Government bureaus, has been the preponderant weight of public opinion behind it. It is also true that the greatest work which the Forest Service has had to do has been to educate the people to the idea that forests are primarily for use. One part of the people has been afraid that they would not be open for use and the other has been fearful that they would be. Both of these notions sprung from the old ideas of the forest preserve where trees stood inviolate. Some wanted that idea continued and others did not.

Perhaps it may be said that the policy of the Forest Service lies between the two. In the administration

of the forest reserves, now the chief work and the logical work of the service, stress is laid on the fact that the reserves are for use, under such restrictions as will continue their greatest use to the greatest number of people for all time. The Government does not take the reserves away from the people, but more truly gives the forest areas to them, and in addition takes care of the gift in such a way that it grows in value year by year; becoming the bankers of the people to whom the people entrust their forest wealth, not that the bank may prosper, but that the people's fund of timber may grow and pay the highest possible interest in forest products, whether those products be building materials, railroad ties, mine props, a conserved water supply for city use or irrigation purposes, or a sustained and regular grazing ground for flocks and herds.

The selfish misconception of the forests, which has been but faintly hinted above, is the other great misconception concerning forestry. It naturally has less excuse than the sentimental one, for it is a conscious and deliberate opposition based upon a desire to obtain for a few the privileges which the forests should hold out to the many. It is perhaps unnecessary to go into any details of this attitude, for the whole history of our public lands has been replete with them. It is sufficient to say that those who see in the Government's attitude of a full use of the forest crops some elements to disquiet them, would see far more if the forests were wholly in the hands of some of the individuals who would exploit the timber lands for present purposes only.

Yet, in conclusion it may be said that those who are working for the proper administration of the forests of the United States, public and private, are vastly encouraged by the growing signs of a rational understanding of what forestry means, and an equal relinquishing of some of the older misconceptions. Organizations of public spirited men and women every where are literally "holding up

the hands" of the Forest Service in the work which it has to do. Persons residing near the forest reserves are enthusiastic over the benefits already accruing, even after so few years of Government administration, and petitions are coming in from all quarters for the creation of new reserves. Lumbermen are quickly adopting forest ideas and are cutting for future crops. Lumber manufacturers are utilizing

their woods to the greatest possible advantage in many instances and waste is being eliminated in a country which is wasteful by nature.

In short, it is coming to be true that the two chief reasons for calling attention to the popular conceptions concerning forestry, is to note how quickly they are passing, and to help a little toward hastening that passage even more.

THE DUTY OF WATER

BY

ALEX McPHERSON

In charge of the Experimental Farm of the Twin Falls (Idaho) Land and Water Co.

THE soil on the Twin Falls tract is commonly considered to be of volcanic origin, varying from two feet to an unknown depth, consisting of very fine particles.

When we began work on the Twin Falls experimental farm in 1905, we dug prospect holes from seven to 10 feet in depth in order to determine the character of the soil, and the amount of moisture present. The only difference we observed in the soil was that the first foot was somewhat darker in color. With regard to moisture, the first 18 inches contained some moisture, but below it was perfectly dry, consequently we irrigated before planting. It required 24 to 36 hours to saturate to a depth varying from seven to 10 feet.

No effort was made to determine the quantity of water used during the season after that. This year (1906) it was determined to measure the amount of water used on the farm, and the amount running off as waste, as well as the evaporation, with a view to determining the quantity of water necessary to keep the soil in proper condition.

The miners' inch was used in measuring half a cubic foot per second of the farm, and a device was employed in connection to obviate any fluctuation in the head. A weir

with an automatic register attached was used as a check on the miners' inch measurement in order that we might be sure that just the amount of water desired was supplied.

At the lower end of the farm, a weir register was installed for measuring the waste. Elias Nelson of the Bureau of Irrigation and drainage investigation, added an evaporating tank.

We began irrigating May 2, with the amount of water allowed under the contract between the settlers and the Twin Falls Land & Water company—that is 1-80 of a cubic foot per second per acre, continuous flow.

The amount of water applied during each month up to the first of September, 1906, is given below, as well as the waste and evaporation:

Total amount applied, 36.10 inches; total percentage, 100 plus.

Total amount precipitation, 0; total percentage, 12.4.

Total amount wasted, 4.49; total percentage, 7.4.

Total amount evaporated, 28.06 total percentage, 77.7.

Total per cent wasted, 7.4.

Total per cent evaporated, 77.7.

Total difference (or water retained by the soil), 5.694 inches; 15.8 per cent.

The waste during the month of July was greater than any other month. This occurred while we were irrigating the lower tier of plats, and no opportunity was afforded whereby we could again use the waste. The farm consists of 40 acres, and being an experimental farm, there are a great many different crops grown, requiring water at different times and in varying quantities.

The evaporation almost equaled the amount of water applied during this month, less the waste and evaporation as shown by the evaporating tank.

Assuming that the evaporation from the water-free surface in the tank was equal to the amount evaporated from the ground, plus the amount used by the crops, we can have some idea of the amount of water actually required.

No doubt if less water had been applied, the results, as far as the crop production is concerned, would have been the same or greater, as was indicated by some tests made by Mr. Nelson, showing that the third foot of soil lost much less moisture in a given time than the first or second foot. The roots of certain crops penetrate to a depth where they would be able to draw upon the moisture to a greater depth than the shallow rooted ones.

If all the crops grown had been of the kind that could have been cultivated, thus conserving the moisture, I am sure much less water would have been required.

Taking the four months, or 122 days as the irrigating season, we used water 24 days, 9 hours in May, 26 days in June, 22 days 9 hours in July, and 23 days and 2 hours in August, leaving $26\frac{1}{2}$ days during the irrigating season when water was not used.

These results show that 1-80 of a cubic foot per second continuous flow is more than necessary at Twin Falls, where the soil is very deep.

I believe if the land were given a thorough irrigation late in the fall, thus storing the moisture in the soil for use the following year, it would be a great saving of time and labor, and materially lessen the amount of water used during the irrigating season, besides being more economical, and as the surrounding areas become moistened through irrigation, with proper cultural methods, less and less water will be necessary each year until half the amount used this year will be sufficient.

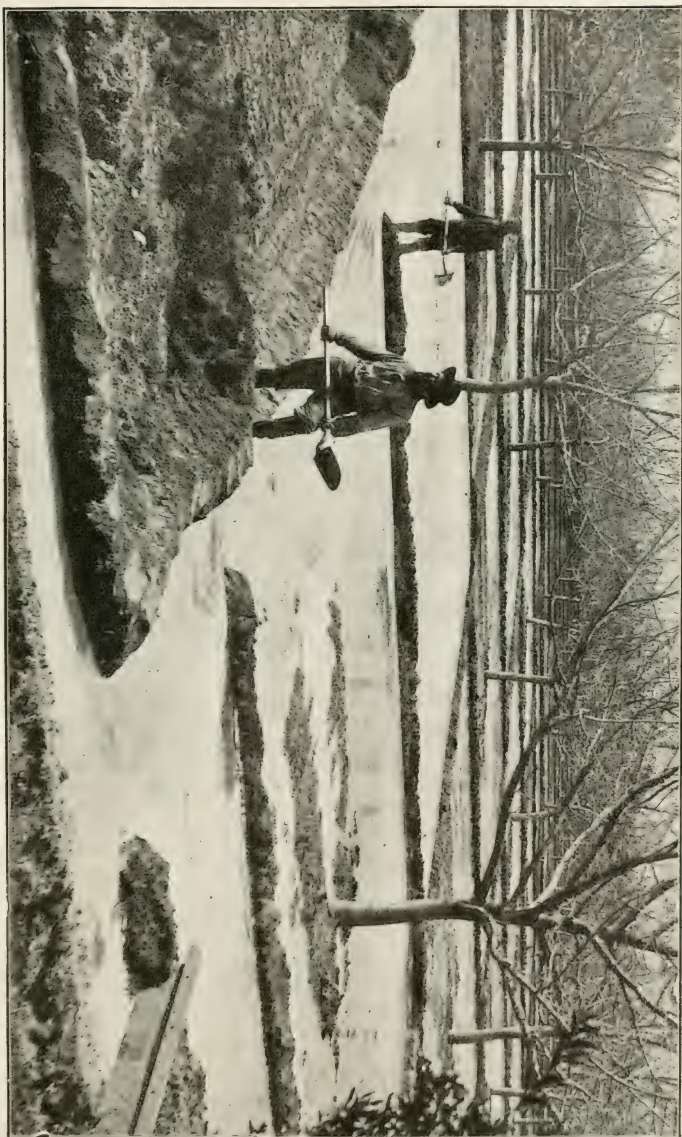
Just what the duty of water will be on the Twin Falls tract a few years hence, I am unable to say, but I believe that it will be far greater than now, as the people are becoming educated in the use of water, and find that less water and more attention to the soil give greater and more beneficial results. This fact was demonstrated this year on a portion of the experiment farm, where last fall it was irrigated late, and only one irrigation was required this season to produce 70 bushels of wheat to the acre and 96 bushels of oats.

The character of the soil and the lay of the land should indicate the best method of applying water.

Two methods have been tried on the Twin Falls tract—flooding, and by furrows or corrugations. After a thorough trial, the corrugation method has been given the preference, and fully 90 per cent of the farmers have adopted this method.

I believe that it is the better of the two, especially when annual crops are grown, such as grain, etc. While it is true that some others claim that the duty of water is greater by flooding than by corrugation, that has not been by experience in the portion of the arid district where I am located.

As it is understood that water only goes into the soil under pressure, and that plants practically stop growing when the air is excluded, which is done by flooding, this is objectionable.



Winter Irrigation in California

Then again we understand that plants only use the ascending or capillary moisture, consequently the ideal way of applying water is to do so without shutting off the air, or causing the soil to bake, which is the result more or less if flooding is followed in this section.

This is especially true of nearly all crops excepting grasses. Then again, water is more easily applied by the corrugation method than by flooding, and if the corrugation system is properly constructed, water can be applied, so that it will run night and day with less labor or care, and with comparatively none, if any, damage to the land.

I consider the corrugation method the best for applying water, at least on this tract, or any other tract having the same conditions.

I will try to describe the system I have advocated to the farmers on this tract, the great portion of whom have followed the advice given:

First, the land is graded, so that the water will not be turned from its course in the corrugations by the high places. It is not necessary to have a perfect outline, but there should always, necessarily, be fall enough so it will continue on its course.

We then run the corrugations or small furrows two feet apart in the direction in which the water is intended to flow. Cross ditches are then run at right angles with the corrugations from 300 to 500 feet apart, according to the grade or fall of the land. Check boxes are put in each cross ditch, the distance apart being governed by the fall of the land. The sharper the pitch, the more check will be necessary. The nearer level the supply ditch is, the less boxes will be required, and within a reasonable limit, will carry sufficient water to irrigate the land intended.

Check boxes are so constructed that the water will flow over and not under the splash boards. The water is raised by these splash

boards as high as needed, so that the water between the check boxes, when raised to full height, will stand on a level, the excess water being allowed to go over the splash boards, and be caught up by another check box.

To divert the water from the cross ditches into the corrugations lath boxes are used—each of these boxes will supply from one to three corrugations, depending upon the pressure in the cross ditch and the length of the corrugations.

Four laths will make two or three boxes, according to the length required. The laths are simply nailed together in the form of a square, and cut into two or three sections, as the case may require. The boxes are then placed in the bank of the ditch, the top of the lath box being a little below the level line of water, so all will receive the same pressure, and flow steadily night and day. If they are kept clear, they will remain in position for service indefinitely.

Three thousand laths will make enough boxes to furnish one for each corrugation on a 40-acre field, the field being cut into three sections.

Boxes in the head ditch for the section below control the drain water from the section above, so that all drain water is picked up and redistributed further on down the field.

When check boxes and lath boxes are set in place, the land being properly graded, irrigation is no longer a task. Under this system, with a regular head of water, irrigation becomes automatic.

The condition of the soil on the Twin Falls tract is such that it takes about 12 hours to properly irrigate a field in each section, as above indicated. On many so arranged farms, irrigation is looked after twice a day—in the morning before work commences, and in the evening after work is over.

It can readily be seen that irrigation under the above system is not

a task, but in reality a pleasure. When flooding is practiced, especially on new land, the water is hard to control, the cost of labor is increased, and damage to the land from water is probable.

Moreover, it is dangerous to attempt flooding at night. By the cor-

rugation method, water can be applied night as well as day with perfect safety.

Besides, under the corrugation method, there are no pools formed in low spots—the land receives water uniformly, in the way and manner desired.

THE FOURTEENTH NATIONAL IRRIGATION CONGRESS

Held at Boise, Idaho, September 3-6

Large Attendance from Many States

BY

LYDIA ADAMS-WILLIAMS

THE Fourteenth National Irrigation Congress, which was in session at Boise, Idaho, during the week beginning September 3, was largely attended, and proved interesting and instructive. There were in attendance nearly 1,500 delegates, representing forty States and Territories, besides several governors of states, Senators and Representatives in Congress, many members of the United States Reclamation and Forest Services, and many others prominent in the progress and development of the country.

Mr. Gifford Pinchot, Chief of the U. S. Forest Service, who was the personal representative of President Roosevelt at the Irrigation Congress, bore a message from the President, which, when read, showed such a wealth of accomplishment and amount of work done along the lines of national irrigation, as to astonish even the most ardent supporters of the Government reclamation policy.

One of the most eloquent addresses delivered before the congress was that of the Vice-President of the United States, Charles Warren Fairbanks.

In a forceful and masterly speech which was listened to with the closest

attention and which was punctuated by frequent applause, the Vice-President covered every phase of the great irrigation problems in which the Government is now engaged, and affirmed his life-long belief in the feasibility of national irrigation, as now contemplated, in the arid and semi-arid regions.

One evening of the congress was given up to a discussion of the forestry question, which was enlivened by a spirited debate engaged in by Mr. Gifford Pinchot, Senator Heyburn, Senator Dubois, Congressman Reeder and others.

Mr. Pinchot gave a lucid explanation of the work of the Forest Service, and of the purposes and aims of forest reserves. His views were upheld by Senator Dubois and Congressman Reeder, and others. Senator Heyburn made an attack upon the manner of creating and regulating forest reserves. He was interrupted many times, and questions, denials and contradictions were hurled at him. Although he parried all thrusts and counter thrusts and made an eloquent and impassioned speech, it was evident that the sympathies of the large audience were with the forester and the forest policy of the Government.

Others of prominence who took part in the deliberations of the congress were F. H. Newell, chief engineer of the Reclamation Service, who delivered an interesting and instruc-

the work of irrigation and drainage investigation, who delivered an able address on "Evolution of Irrigation Institutions;" Morris Bien and L. H. Taylor, of the Reclamation Service;



UNITED STATES SENATOR WELDON B. HEYBURN
Of Idaho, whose Antagonism to the Government Forest Policy in the West
is Most Pronounced.

tive address on "Progress of National Reclamation;" C. D. Walcott, director of the United States Geological Survey, who spoke on "Relation of Government reclamation work to private enterprise;" Elwood Mead, director of

Mr. Wm. L. Hall, Mr. E. A. Sterling, Mr. A. F. Potter, Mr. Hill, Mr. Sherman, Mr. Siecke, and others of the Forest Service; Senator Carter, Senator Heyburn, Senator Dubois, Senator Moses E. Clapp, Hon. Frank W.

Mondell, Hon. W. W. Reeder, Governor Chamberlain, of Oregon; Governor Mead, of Washington; Governor Gooding, of Idaho; Hon. St. George Tucker, president of the Jamestown Exposition; Judge L. W. Shurtliff, Thomas H. Means, Hon. John F. Lacey, Wayne Darlington, Hon. C. C. Moore, D. E. Burley, Hon. Cyrus Happy, State Senator John A. Laycock, of Oregon; Monte B. Gwinn and John McMillan, and Hon. Edgar Wilson.

Part of the last day's session was devoted to the election of officers, with the following result: President, Hon. George E. Chamberlain, governor of Oregon; first vice-president, Hon. John H. Smith, of Utah; second vice-president, Hon. H. B. Maxson, of Nevada; third vice-president, Hon. George W. Barstow, of Texas; secretary, D. H. Anderson, of Chicago.

Sacramento, Cal., was selected as the place for holding the fifteenth session of the National Irrigation Congress.

The report of the committee on resolutions as presented to and adopted by the congress expresses the hope that the governmental irrigation works under construction and in contemplation will be pushed to an early completion; heartily approves the efficient and thorough work of the federal Reclamation Service and expresses the fullest confidence in the honesty and ability of that service; endorses and commends the earnest and efficient work of the national weather bureau; commends the work of the Federal Agricultural Department in its irrigation and drainage investigations; recommends that the Irrigation Congress authorize its president to appoint a committee of five members to carry on a campaign of publicity in relation to irrigation, this committee to be authorized to employ a secretary at a salary of \$25 a month; pledges earnest support of the Federal Forest Service in its efforts to maintain and improve the country's water sheds; favors the passage, with certain amendments, of Senate bill No. 4264, relating to the relinquishment of reservoir sites, with the privilege of selecting lieu lands;

expresses the opinion that Government enterprise for reclamation should not unnecessarily interfere with prior private enterprises; endorses the Federal Department of Agriculture's experiments in dry farming in semi-arid regions; recommends the enactment of a federal law prescribing penalties for unlawful interference with federal headgates and other irrigation works.

The committee recommended the following resolution in relation to the tariff on sugar from the Philippines, which was adopted:

"Inasmuch as the sugar beet industry in irrigated America returns to our farmers an annual revenue of over \$20,000,000, and as the production at home of the sugar we now import from the tropics would afford our farmers an additional annual market for nearly \$100,000,000 of beets, and as it has been urged that the United States Congress further stimulate the sugar industry of the Philippine islands to produce all or a portion of the sugar we of arid America had hoped to produce.

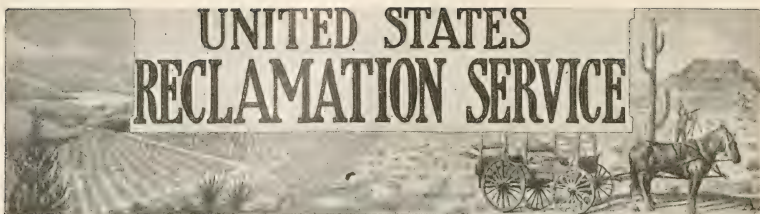
"Therefore, we protest against any further legislative concessions in favor of Philippine sugar and urge that legislative agitation and attacks on the sugar production of this country cease, that this great industry of arid America may be fully developed."

In conclusion the resolutions express thanks to the people of Boise for the manner in which the delegates were entertained and compliment the retiring officers of the congress.

Another resolution expressed appreciation of the interest shown by President Roosevelt in irrigation and reclamation work and of Vice-President Fairbanks' courtesy in coming to address the congress.

A resolution introduced at the instance of persons interested in the Arkansas River litigation and adopted says:

"We recommend that the Congress of the United States consider the extension of the jurisdiction of the United States courts to provide for the judicial determination of water rights on interstate streams."



Government Irrigation Work During the Month

Pathfinder Dam

The Supervising Engineer in charge of the North Platte irrigation project, Wyoming-Nebraska, reports that on August 15th the foundation was ready for stone laying and the first stone was set in the great Pathfinder dam. The work of stone laying has continued without interruption and it was expected that the entire foundation would be ready for masonry by the present time.

The construction of this dam has for its object the storage of flood waters of the North Platte River, to be used for the irrigation of large tracts of land in Nebraska and Wyoming. It will contain 53,000 cubic yards of masonry, erected at a cost of \$1,000,000. The capacity of the reservoir will be 43,560,000,000 cubic feet, or more than ten times that of the Croton reservoir in New York. The annual discharge of the river is sufficient to cover 1,000,000 acres of land one foot in depth, and the dam is capable of holding back the flood and surplus waters of the entire year.

According to the last census, within the drainage basin of the Platte River is found the largest area irrigated by one stream in the United States, and the value of the improved agricultural land is probably as high as any other section, with the possible exception of the fruit belts of California and central Colorado. All the natural late summer flow of the stream has long since been exhausted by private ditches diverting water from it. A million acre feet of water, not a

drop of which is now in use, will be stored annually by the Pathfinder dam, and directed through canals and ditches upon 300,000 acres of land. The canal system will be the longest in the United States, the main or Interstate canal having a length of 140 miles. The first 45 miles of this canal was completed early this spring and water turned into it on May 5th. Some 1,200 acres of land are in crop and have been watered during the season.

The Geddis and Seerie Stone Company of Denver, Colo., are constructing the dam. Excellent progress is being made on all parts of the system. The great work not only means the reclamation of a vast tract of arid land, but the prevention forever of the destructive floods which annually have visited the valley.

Shasta Valley

During the fall, summer and winter of 1904, petitions signed by practically all the resident land owners of Shasta Valley, Cal., were presented to the Engineer of the Reclamation Service, asking that survey be made to determine the feasibility of irrigating that valley from the Klamath River. A field party was accordingly assigned to the work and during August and September of 1905 a reconnaissance of the valley was made.

Shasta Valley is located in northern California and contains the largest body of farming land in Siskiyou County. It is from two to six miles in width, about twenty-four miles long, and lies at an elevation of from

2,400 to 3,000 feet. It is traveled throughout its entire length by the Southern Pacific Railway, which affords excellent transportation facilities to the markets of San Francisco and Portland. The climate is mild, the temperature ranging from 110 degrees above to 5 degrees below zero. The springs are rather late and frosty. For the last ten years there has been an average rainfall of 17.6 inches, but as not more than half an inch of this comes during July, August, and September, irrigation is necessary for successful farming.

There are approximately 100,000 acres of agricultural land in Shasta Valley, held for the most part in private ownership. Of this amount about 58,100 acres are irrigable from Klamath River from gravity flow, and it is believed possible to irrigate 10,000 acres more by pumping. A lift of 200 feet would be required, and power could be developed for this purpose, although the cost would probably be excessive. From Little River and various springs there are now perhaps 10,000 acres under an imperfect system of irrigation.

About sixteen miles below Keno, Ore., the waters of Klamath River can be diverted by an eight-foot weir and carried along the east bank of the river into Shasta Valley, and there applied for irrigation upon 58,100 acres of land. Because of the precipitous canyons the water must be carried for a distance of twenty miles either by a series of long tunnels, or by short tunnels and cement lined canals. The former could be maintained with much less expense when once constructed, but the first cost would be so great that a line contemplating three short tunnels, two siphons, and cement lined canals was surveyed.

The total estimated cost of the system as outlined is approximately \$3,784,238, or at the rate of \$65.13 per acre for the construction of works to irrigate 58,100 acres. There are about 5,000 people in this valley, depending upon lumbering, mining, stock-raising and farming for a livelihood.

Wheat, oats, barley, vegetables, wild hay, alfalfa and fruits are grown.

With the enthusiasm and enterprise so characteristic of the farmers of California, the land owners have expressed a desire to organize a water users' association and to coöperate in every way possible with the Government if the project is undertaken. In view of the large acreage cost and the present state of the reclamation fund, however, the engineers of the Reclamation Service do not deem it wise to recommend consideration of the project until the Klamath project is beginning to return revenue at least. There are many opportunities for reclamation work in the Sacramento Valley, and in case a small economical project develops it would be manifestly unfair to the State to begin work which for lack of funds might not be completed for many years when other work could be taken up and completed quickly.

Lower Yellowstone Dam

The Secretary of the Interior has awarded contract for the construction of the Lower Yellowstone dam,

Lower Yellowstone irrigation project, North Dakota-Montana, to the Pacific Coast Construction Company, of Portland, Ore., for the sum of: \$142,825.

This dam is to be a rock-filled, timber cribbed structure across the Yellowstone River at the headworks of the canal, about eighteen miles northeast of Glendive, Mont., and according to the terms of the contract will be completed February 1, 1909.

The river at this point has been considered navigable, although boats have not been up the Yellowstone River since the time of the Custer massacre. At that time the daring steamboat men succeeded in forcing light draft boats up the Yellowstone and up the Big Horn to a point where they could receive the wounded soldiers and bring relief to the troops.

The building of this dam marks the close of navigation on the Yellowstone River and the practical dedication of its waters to irrigation and the crea-

tion of homes for thousands of settlers in place of allowing the stream to flow idly to join the Missouri without benefit to the community.

On Cash Basis

The Reclamation Service has definitely put all of its engineers and experts on a cash basis. During the period of initiation of the work it was necessary to pay the men in the field not only their regular wages, but also to furnish them subsistence. With the creation of permanent camps or stations the necessity of furnishing rations no longer existed, and it seemed wise to require that all men, whether laborers or engineers, obtaining subsistence at these camps should pay a flat rate of 75 cents per day for meals furnished. This charge is accordingly deducted from the salaries or wages paid, and these are adjusted accordingly, so that salaries are now comparable on a money basis, and are not confused with the questions of subsistence.

Tunnel Half Done

More than one-half of the great Gunnison tunnel in Colorado was completed by the first of September, according to a report from the engineer in charge of the work. The total length from the east portal in Gunnison canyon to heading No. 1 on August 31st was 4,416 feet. The total length from the west portal, in Uncompahgre Valley, was 10,896 feet, making a total of 15,312 feet.

The Reclamation Service, which is prosecuting the work by force account, has broken the world's record in tunnel construction on this work. During July and August, however, the rate of progress was reduced on account of an extremely hard vein of rock in heading No. 1 and the treacherous ground in heading No. 2, which required handling with the utmost caution in order to prevent loss of life and destruction of property. The difficulties in connection with ventilation and transportation also increase with the length of tunnel from portals. Six hundred and ninety-eight feet were ex-

cavated during August. Machinery is in place and the work of placing concrete masonry will commence this month. Work on the South side canal is progressing satisfactorily.

Pumping in Kansas

In September, 1905, the Secretary of the Interior approved the plans for the construction of a pumping plant in the Arkansas Valley, near Garden City, Kans., to supply water to the Farmers' Ditch. Contracts have been let and the work of construction of this project is now under way under the supervision of the U. S. Reclamation Service.

Mr. Charles S. Slichter, of Madison, Wis., who made an extensive investigation of the movement of the underground waters of the Arkansas Valley is in Washington for a few days and is most enthusiastic over the future of that portion of Kansas. He said: "The stimulus given to this part of the Arkansas Valley by the proposed pumping plant has greatly developed the installation of pumping plants by private parties. The census recently taken shows that 162 privately built pumping plants have been put in service in the Arkansas Valley within the last twelve months.

"A large number of these pumping plants are operated by gasoline engines. A few that have been installed at Rocky Ford, Colo., use hard coal in gas generators which supply gas engines. These gas plants at Rocky Ford show very remarkably results in the production of power at low cost. A test of a thirty-five horsepower pumping engine at Rocky Ford for ten days during the month of May, 1906, showed that the cost of coal per hour averaged but 7 cents. At this place the fuel used costs \$6 per ton at the ranch.

"It is believed that the development of the bottom lands in Arkansas Valley by private pumping plants has just begun, and a very large number of new ones will be put in during the present year."

Apportioning the Fund

A few weeks ago announcement was made of the receipts from the sale of public lands in the arid States and Territories. When it was discovered that the increment to the reclamation fund was considerably in excess of the estimates there was much rejoicing throughout the entire West.

Letters have been pouring in to the office of the Reclamation Service from settlers, legislatures, and other interested in the movement, requesting the allotment of funds and initiation of irrigation works in various localities.

It is not within the province of the director to apportion reclamation funds, but merely to call the attention of the Secretary of the Interior to feasible projects. The engineers of the Reclamation Service are not losing sight of opportunities of extending the work, and many projects have been investigated and will be taken under consideration as soon as funds for their construction become available. The Secretary of the Interior has already apportioned the fund for some years in advance, and although the receipts from the sales of land may be larger than anticipated by the General Land Office, yet this increase is more than offset by the recent advance in the price of labor and materials and the diminished efficiency of ordinary labor. The rigid enforcement of the eight-hour law has also contributed to the general increase in costs to the contractor. A number of prominent contractors are failing or on the verge of bankruptcy and prices of construction are running up rapidly. When the contractors become unable to fulfill their contracts the Reclamation Service is obliged to carry on the work by paying higher prices than the contractors can afford to give. But even under such circumstances the labor supply is unequal to the demand.

Most of the reclamation works are situated in regions remote from large towns, and after eight hours of labor there is little opportunity for relaxation or enjoyment. During the long hot days the man who is exercising

moderately in the sun fares more comfortably than the one who has nothing to distract his attention from his discomfort in the hot bunk house. When life grows too monotonous the men throw up their jobs, secure in the knowledge that in these prosperous times they can secure employment elsewhere without much trouble.

Another factor to be considered in the allotment of the reclamation fund is the fact that there has already passed the Senate and been favorably reported to the House, a bill taking \$1,000,000 out of the reclamation fund for drainage in North Dakota, and there are a number of other bills pending which, it is asserted, have fair chance of passage if the first bill gets through Congress. Under these circumstances the Department may not consider it advisable to enter upon any further projects until the probable diminution of the reclamation fund is made known.

Several of the twenty-two projects now under way, as well as numerous others which will be taken up immediately funds become available, will receive a serious set back if the reclamation fund is diverted for other purposes. Citizens of the West are even now impatient that the Department is forced to delay in talking up the projects that would make productive millions of acres of arid land and afford homes for a multitude of settlers. All these projects require large sums of money to complete, and it is only by the wisest use of the fund designed for the purpose by Congress that the work can be carried to successful completion. That other improvements in other States are needed there is no doubt, but this nation is able to make them without endangering the beneficent work of homebuilding in the West.

It has been said of a Roman Emperor, "He found Rome brick; he left it marble." So of this generation of Americans let it be said "They found the West a desert; they left it a Garden of Eden."

**Oklahoma
Conditions**

Irrigation in Oklahoma under the terms of the Reclamation Act has been delayed because all of the examinations and surveys that have been made have failed so far to develop a practical project from an economic stand point. The engineers in the field have been seriously hampered by the rainy weather and flooded streams.

As a preliminary and essential element of the investigation, it was decided to erect a pumping plant to utilize the river water and determine by actual experiment whether it was too saline for use on most crops. The machinery was accordingly ordered and has finally been installed after many vexatious delays due to floods and boggy roads. The pump is now set, the canals from it are constructed, and the plant is in good working order.

This is an exceptionally wet year. If next year is ordinarily dry it will be

possible to show what can be done with irrigation, but with the perversity of inanimate things the natural forces all seem to combine against giving the pumping plant a satisfactory trial. There is no doubt that years of drought will come when irrigation will be badly needed, but at present the farmers are growing crops by dependence upon natural rainfall.

The engineers are continuing their investigations and will soon be able to make a full report upon the Red River project. They will also make investigations as to the quantity and quality of underground waters with reference to their use for irrigation. If these investigations prove satisfactory as to the water supply, another pumping plant will probably be installed for experiment with ground waters. The surveys and investigations in Oklahoma will not cease until a practicable project is found or it is demonstrated that the proper conditions do not exist for economical irrigation.



The Month in Government Forest Work

**Testing
Vehicle
Woods**

During the past few months the Forest Service has been conducting a series of tests on vehicle woods. These tests were made on three manufactured parts; buggy spokes, wagon poles, and axles. The material was furnished by wagon companies and wheel manufacturers, and the tests conducted at the timber testing station of the Forest Service at Purdue University, Lafayette, Ind. One series of these tests has been completed

but all of the data is not yet ready for publication.

The material tested was of the grades in common use. Buggy spokes were of the grades A, B, C, D, E, and culls, for the sarven wheel. In this selection, the primary object was to determine whether the grading system was compatible with the strength and toughness of the spokes, and also to ascertain the relative strength and toughness of white and red hickory spokes. Five hundred spokes consti-

tuted the series. The poles were of two grades of oak and one grade of southern pine. Part of the common oak poles were trussed. Forty poles were tested. The axles were of hickory and maple of three designs, thimble, skein, thimble skein trussed, and long sleeve skein design, making forty-eight in all. The object in this series was to obtain the comparative strength of the two woods and of the different constructions.

The results from the spoke tests show more than 50 per cent error in the present grading system, which is largely due to the traditional prejudice and consequent discrimination against red hickory. No red spokes are now allowed in the A and B grades, yet these tests show that a large proportion of the red spokes now included in the lower grades should be, because of their strength and toughness, included in the highest grades. The resilience factor which is determined by maximum load and toughness, varies directly with the weight, showing that the best criterion for judging the utility of spokes is the weight. It is also shown by the tests that weight for weight, the red and mixed spokes are fully as strong as the white ones. Of defects serious enough to affect the strength those near the center of the spokes are considerably more damaging than the defects near the ends. A study of the tested spokes as they now appear at the Purdue University laboratory, would give much practical information to commercial graders. These tests will be supplemented by another series on spokes manufactured of sound dead hickory which occurs in considerable quantity in the South and is not now used for this purpose.

The tests on the wagon poles brought out several important points. The present manner of attaching poles could be much improved since the construction at the hounds is much weaker than the pole itself. The present style of trussing is of little value because the truss is applied along the neutral axis of the pole. The Southern pine pole will support a greater maximum

load than the common oak pole, but is not as strong as the select oak pole. With reference to load at elastic limit, the Southern pine ranks first. The failure in the oak poles generally occurred near the hounds and were fibrous and localized. Fractures in the pine poles, on the other hand, extended over distances of five or six feet, long pieces often breaking off where a fracture occurred. These poles were not of the best grade of Southern pine, most of them having the appearance of shortleaf pine and being largely sapwood. The exact species will be determined later, yet, for commercial purposes this is comparatively unimportant because the Southern pines are largely sold under the name of "yellow pine" without distinction as to species.

Results from the axle tests have not been sufficiently correlated to warrant definite statements regarding them, but it can be said that there is considerable room for improvement in the present method of trussing.

Further testing work along this line will be carried on during the coming winter. A series of shaft tests on hickory and red oak will be made, a number on eucalyptus axles, and some on cultivator poles of red fir and longleaf pine.

New Forest Reserve

By Presidential proclamation, signed August 10, a new forest reserve has been created in south-central Montana, to be known as the Crazy Mountains Forest Reserve, taking its name from the mountain range which it covers. The mountains themselves are named from their rugged contours and peculiar profiles. They rise to a height of 11,178 feet above sea-level, and to 5,000 feet above the surrounding foothills. Their heavy snowfall is of the utmost importance to three river systems; the Yellowstone, the Musselshell, and the Missouri, through Sixteen Mile Creek. The new reserve lies about midway between the Little Belt Forest Reserve to the north and the Absaroga Division of the Yellowstone Forest Reserve to the south. The

Montana Railroad is about ten miles north and the Northern Pacific twenty-five miles south. Topographically, the Crazy Mountains may be divided into two sections, of which the southern is, without doubt, the roughest in the State. Here the streams, enclosed in deep canyons, take their rise in the melting snow of high peaks of slide rock. The northern part is less forbidding, the ridges being quite generally covered with grass. The mountains have a quite different climatic record from the surrounding lowlands. Fresh snow has been seen on the crests of the Crazy Mountains in August. From October to June there may be snow at any time. Snow drifts at the heads of some of the larger creeks, when seen in mid-July, show no signs of ever being completely melted. Rock Creek has even a small glacier at its head. Snow lies at a depth of from 3 to 6 feet in winter, and travel is then possible only on skees. In July and August there are frequent thunder showers in the peaks.

The forest is typical of the lodgepole pine forest of the Rockies, and that species grows in pure stand over three-tenths of the timbered area. Red fir covers two-tenths in pure stand, and the remaining five-tenths is a mixture of the two species, with the lodgepole pine predominating. In scattered growth there is some limber pine, balsam fir, juniper, Engelmann spruce, and the usual cottonwood and willow in the creek bottoms. Of the two main types, the lodgepole pine will average about 4,000 feet, board measure, to the acre, the red fir 6,000 feet. Lumbering operations on the reserve are not extensive, and the mills, six in number, not large. Since only the larger trees are taken, lumbering would be beneficial if forest fires did not almost invariably follow. There are no mines of importance, and the timber is used for ties, fuel, and ranch buildings. The greatest importance of the forest, then, is as a protective cover to conserve the heavy snow and rainfall, since the Crazy Mountains

form a natural water-supply area for a growing and prosperous farming country in the foothill region around them.

Within the limits of the reserve sheep grazing is the most important industry, the sheepmen being permanently established on railroad lands which they have bought. Therefore the sheep-grazing problem is the largest one with which the administration of the new reserve will have to deal. Perhaps 100,000 sheep are ranged there, and some 1,200 goats. There are possibly 5,000 cattle and horses on the reserve. Through cooperation with the stock owners, there will be definitely established and thoroughly understood, regulations as to the duration of the grazing season, distribution of stock, and number grazed.

The sentiment of the region is generally in favor of the reserve because of two things: There will be Government control of the range, assuring both sheep and cattlemen in well-defined rights; and a prevention of fires. Yet, as a whole, the Crazy Mountains Forest Reserve will serve five principal uses: It will maintain a natural reservoir for the surrounding country, which belongs to the important type of "sub-irrigated land;" will preserve several excellent water-power sites; will prevent lumbering waste, and insure a permanency to the lumber supply; will equitably settle the grazing problem; will prevent fires.

The total area of the new reserve is 234,760 acres.

Timber Tests

A series of tests to determine the relative strength of green tamarack and green Norway pine timber has recently been made by the Forest Service at the timber testing laboratory at Purdue University, Lafayette, Ind. The material was furnished by the Kettle River Quarries Company of Minneapolis, and nearly all of it grew in St. Louis County, Minnesota. The strength values obtained apply only approximately to timber of the same species grown elsewhere.

Bending tests were made upon beams with a span of 13 feet 6 inches and ranging from 4 by 10 by 6 by 12 inches in cross-sections. From these tests, showing the strength and stiffness of sound green tamarack and Norway pine in structural sizes, the results were as follows:

Strength (Modulus of rupture)—Tamarack, 4,600 pounds per square inch; Norway pine, 4,000 pounds per square inch.

Stiffness (Modulus of elasticity)—Tamarack, 1,240,000 pounds per square inch; Norway pine, 1,189,000 pounds per square inch.

Green tamarack thus appears to be uniformly stronger and stiffer than green Norway pine. When over-dry tamarack weighs twenty-nine pounds per cubic foot and Norway pine about twenty-four pounds per cubic foot.

Tamarack is usually of slower growth than the pine. Bending tests on small clear pieces indicate that strength decreases in tamarack when the rate of growth is faster than an inch in eight years, and in Norway pine when the growth is faster than an inch in ten years. Comparative tests on the seasoned timber of the two species will be made later.

Change of Boundaries

The boundaries of the Grand Canyon Forest Reserve, Arizona, have been changed by the exclusion from the reserve of a tract twelve miles long and six miles wide at the extreme northern limit of the reserve. Whereas the north boundary of the reserve formerly touched the Utah State line, it is now six miles south of it. At the same time a slight addition has been made to the reserve consisting of a narrow strip of land along the northern portion of the eastern boundary. This tract, twelve miles long and averaging little more than a mile in width, has been added to bring the reserve boundary out to the base of the mountains, where it can be readily located by the stockmen. The original boundary ran about two miles back from the base of the mountain, where it could

not be seen except by the merest chance.

In the area recommended for exclusion there is no timber of value. The forest growth is of inferior pinon and mountain mahogany. The region is entirely without water, so that it is impossible to keep a patrol or to maintain range headquarters. Yet it contains the main highway to either side of the range. By its exclusion from the reserve, stock may be crossed at will, without any restrictions upon those who are compelled to use this highway, who would be under considerable inconvenience and difficulty in visiting forest officers for permits.

As the reserve now stands its area is 2,267,300 acres.

Holding Power of Railroad Spikes

The Forest Service has completed a series of tests to determine the holding power of different forms of railroad spikes. The tests were made on ordinary commercial ties of loblolly pine, oak, chestnut, and other woods. The spikes used were of four kinds—common driven spikes, a driven spike which has about the same form as the common spike with a lengthwise channel on the side away from the rail; screw spikes of the American type, and screw spikes similar to those in use on European railroads, and differing from the American spike mainly in the manner of finishing the thread under the head.

The common and the channeled spikes were driven into the ties in the usual manner to a depth of five inches. A hole of the same diameter as the spike at the base of the thread was bored for the screw spikes, which were then screwed down to the same depth as the driven spikes. The ties were then placed in the testing machine and the force required to pull each spike was recorded.

The average force required to pull common spikes varies from 7,000 pounds in white oak, to 3,600 pounds in loblolly pine, and 3,000 pounds in chestnut. The holding power of the channeled spike is somewhat greater.

feet and a diameter of 15 inches in thirty years, but so rapid a growth is uncommon here." Near New Haven, Conn., the best of the dominant trees of a small plantation have attained a height of 50 to 53 feet and a diameter of 9 to 12 inches in twenty-three years. The seedlings were imported from Europe and were about 2½ feet high and three to five years old when planted. In dense stands the diameter growth is often rather slow, in proportion to the rapid height growth.

THE WOOD; ITS ECONOMIC USES.

The wood of the Larch is heavy, hard, strong, flexible, and very durable in contact with the ground. When grown on good soil it is yellowish-white, but in cold, elevated situations it is reddish-brown and much harder. Because of its strength and durability, it is very valuable for cross-ties, poles, posts, etc., and is largely used in ship building.

PROPAGATION.

Reproduction is entirely by seeds. Propagation is best effected by transplanting nursery-grown seedlings or transplants to the plantation. The seeds are borne abundantly in small, upright cones, and are easily collected. In this country, however, because of the small number of trees which have reached fruiting age, it is necessary to use imported seeds, which may be obtained direct from foreign dealers or through the larger home seedsmen. Prices are as low as \$1 per pound.

Although a deciduous tree, the Larch is a conifer and should be treated as such in all nursery and planting operations. Nursery culture is simple and should be conducted according to the general rules given in Bulletin No. 29 of this Bureau. Nursery seed beds should be prepared in moist loam, and the seeds sown in shallow drills 6 inches apart, and lightly covered with fine dirt. Partial protection from the sun and beating rain should be given the young seedlings for the first two years. The simplest screen for protective purposes is made of lath

nailed to a light frame, the laths alternating with open spaces to their width, so as to give a half shade. These frames may be permanently fastened at a height of 5 or 6 feet above the beds so that a man can work under them, or may be temporarily supported on posts or poles 1½ to 2 feet from the ground. Seedlings may be transferred to the field when two years old, or at this age transplanted to nursery rows and not put in the field until a year later. In transplanting Larch it is absolutely essential that the work be done very early in the spring, as the buds start early and a disturbance of the plants after growth begins means death or serious injury to the young trees.

Plants in either a pure or mixed European Larch plantation should be set from 4 to 6 feet apart each way; the shorter distance is preferable in the West. In the West the ground must be broken and well subdued before the plants are set. Check rows may be made with a plow or cultivator and the plants set in by hand, or they may be set in holes dug with a spade. Corn may be raised between the rows for several years. Cultivation of the young plantation is essential in most cases. In the East the preliminary preparation of the land and the subsequent cultivation may be dispensed with.

Mixed plantations are in general most desirable. The Larch may be combined to advantage with the following species: White and Green Ash, White and Slippery Elm, Scotch Pine, Red Pine, White Pine, Norway Spruce, and Red Cedar. Often three or four of these species may be advantageously combined, as the European Larch, White Elm, White Ash, Red Cedar, or White Pine. In such mixtures considerable care and skill are required in the thinnings, which should be done when the trees begin crowding.

In many portions of the country others species are of greater value and better adapted for planting than the

European Larch. It is, however, a valuable tree for certain sections and for combining in many mixtures. In Europe it is not considered a lowland tree and the best specimens are produced on the uplands, but it readily adapts itself to wet, low ground, and should often be planted in moist situations where other trees would not thrive. As an ornamental tree it is of good form and in the spring is made beautiful by the delicate nature and verdant freshness of the newly expanded clusters of needle-like leaves.

ENEMIES.

The mature native Tamarack of the Northeast was almost entirely killed some eighteen years ago by the larvæ of a sawfly, and young trees are still seriously injured by insects. As yet no serious damage by this insect has been reported from plantations of the European species in the West, but the small plots which exist in New England have been badly injured and in some cases nearly destroyed by insect pests. In case of serious attack, specimens should be sent to the Division of Entomology for identification and suggestions as to control. On low ground a fungus known as *Trametes pini* often attacks the Larch and so destroys the substance of the wood that the tree breaks down in even a slight wind.

NOTABLE PLANTATIONS.

A grove of European Larch near Clear Lake, S. Dak., was planted on the high prairie about fifteen years ago (1886). The trees are now 3 to 5 inches in diameter at the base and 30 to 35 feet tall. The stand was originally very thick, the trees probably standing 3 feet by 4 feet. Most of the trees will each make a single

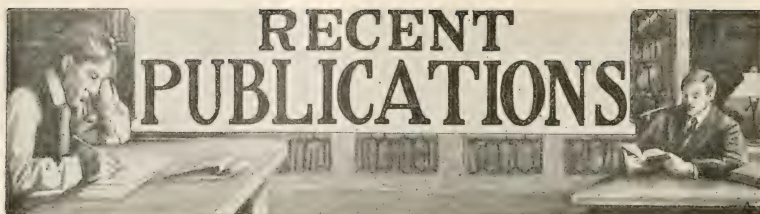
post and there are many that would make stakes in addition, almost large enough for posts. The trees from which this plantation was started were shipped from England.

A plantation of one and one-half acres, now owned by Mr. Sulfin, is situated near Dundee, Ill. The trees were planted at a uniform distance of 4 by 4 feet and are now twenty-eight years old, tall and straight, with no side branches. On a half-acre plot that was measured, there were 400 trees with an average diameter at base of 6.4 inches, at 7 feet from the ground 5.1 inches, and an average height of 35 feet. Nineteen of the trees are now suitable for telephone poles, i. e., 9 or more inches in diameter and 30 feet high.

At Greenfield Hill, Conn., is a mixed plantation of European Larch and White Pine planted 5 by 5 feet each way in equal proportion. The site was rich cultivated land and the growth was correspondingly rapid. Measurements made on 7,509 trees when fifteen years old gave the following: Average height, 33.2 feet; diameter of average tree, 3.5 inches. Up to the summer of 1901 practically no injury had been done by the sawfly, but that summer the larvæ were present in large numbers and were rapidly defoliating the trees.

A variety of the common European Larch known as *Larix europæa siberica* is largely grown in central Russia. Prof. N. E. Hansen, of South Dakota, believes that it would be a very desirable tree for our prairie States, as it is much hardier than the common form and much superior to it in many ways. Our commercial growers should introduce this desirable variety.





The Land of To-morrow. By Major J. Orton Kerbey; 12mo.; 400 pp.; illustrated. W. F. Brainard, New York, 1906.

"The Land of To-morrow" is a descriptive narrative by a newspaper man and ex-consul, giving interesting experiences and observations during a journey to the headwaters of the Amazon and over the Andes through the unknown La Tierra de Manana, the California of South America. The book contains the history of a research for rubber, instituted while Col. Kerbey was consul to Para. Aside from its value as the only practical summary of the rubber industry, there is the added charm of adventure in a little known and practically undeveloped country, whose natural resources, in the lines of forests and mineral wealth, is vast. The many illustrations are excellent.

The Philippine Journal of Science. Published by the Bureau of Science of the Government of the Philippine Islands. Vol. I, Nos. 1 and 2, June and July, 1906. Manila, 1906.

The June and July numbers of the *Journal* contain a number of articles on various scientific subjects. Readers of FORESTRY AND IRRIGATION will, however, be particularly interested in Mr. H. N. Whitford's contribution, on "The Vegetation of the Lamao Forest Reserve," appearing in both issues of the publication. The article contains some interesting tables of the various tree-species in sample plots, with both general and specific observations regarding tree growth and variety. Some interesting pictures of island forests are included.

Irrigation in Montana. Bulletin No. 72, Office of Experiment Stations, U. S. Department of Agriculture. By Samuel Fortier, assisted by A. P. Stover and J. S. Baker. Washington, Government Printing Office, 1906.

In their study of conditions in Montana, Prof. Fortier and his assistants paid special attention to the means of bringing about the more economical use of the water supply—now abundant—in order to make possible the largest development of the State's agriculture, and correct present sources of

waste. After discussion of the various phases of the situation, the bulletin makes certain recommendations which, it is hoped, will help the people of Montana in securing protective and corrective legislation. Prof. Fortier describes some improvements in ditch-construction, and in irrigation practice that should be valuable hints to the irrigator.

Forest Planting on Coal Lands in Western Pennsylvania. Circular No. 41, U. S. Forest Service. By S. N. Spring; 16 pp. Government Printing Office, Washington.

The occasion for forest planting in this locality—the most important bituminous coal region of the United States—rests primarily upon the growing need of pit props, and is intimately related to the whole industrial development of southwestern Pennsylvania. Intensive agriculture, forced by an increasing population has led, in many cases, to exhaustion of the soil, through poor methods and other causes, and when the coal mining industry shifts elsewhere, as it is certain to do in the future, the best crop such land can produce is timber. The present volume is rich in suggestions for planting in this locality, from the observations of the Forest Service in preparing a planting plan in this section for the H. C. Frick Coke Co.

Sugar Pine and Western Yellow Pine in California. Bulletin No. 69, U. S. Forest Service. 42 pp.; illustrated. Government Printing Office, 1906.

The object of the study here presented is to devise modifications in present lumbering methods which may lead to a more conservative treatment of the yellow and sugar pine forests of California. The latter has been one of the most valuable timber trees of the state, and, with yellow pine, with which it is intimately associated, both in the forest and the market, has been brought into greater prominence through the exhaustion of eastern pine forests. The bulletin makes it plain that conservative management is both necessary and practicable if the tree is destined to be extensively used.

Forestry and Irrigation

H. M. SUTER, Editor

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JOHN F. SHERIDAN



(Courtesy, Office of Experiment Stations, Department of Agriculture.)

A Typical Utah Scene ; Steamboat Mountain, Virgin River Watershed.

FORESTRY AND IRRIGATION

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OCTOBER, 1906.

NO. 10

NEWS AND NOTES

Status of Reclamation Work

The summer campaign of the Reclamation Service is practically over and the organization of field forces is being readjusted to suit the winter work, except in the extreme southern part of the arid region, where climatic conditions favor the continuance of field work throughout the year.

Although but little more than four years have elapsed since the passage of the Reclamation Act, the work has progressed so rapidly that one or more projects are now under way in each arid state and territory, and on fourteen of these projects the work has reached a stage where it is expected water can be supplied to a portion of the lands under them, amounting to nearly 400,000 acres, next season. This means the addition of 5,000 homes to the West, and the return of nearly \$1,000,000 per annum to the Reclamation fund to be used over again for the reclamation of more land.

It is not probable that this entire acreage will actually be irrigated next season. Under a few of the projects a small portion of the land is still public domain. In some sections the settlers will not have fulfilled their

part of the work by preparing the land to receive the water and constructing the lateral ditches for conveying it over their fields. It is expected, however, that the major portion of this area will receive water from the Government systems in 1907. It is believed that with the practical demonstration which the irrigation of the first units of the projects now under way will furnish by the time the systems reach completion, there will not be an acre of available land under them.

The operations of the Reclamation Act have stimulated development in the West in many lines. Private enterprise is already engaged upon similar irrigation works, and new lines of railroad are extending into the most remote sections of the intermountain country in order to reach the large tracts of land which will support a dense population in a few years. This development has resulted in a woful scarcity of labor, and unceasing efforts are necessary in order that the irrigation works may not be seriously delayed from this cause. Inquiries as to the location of irrigation systems and local conditions are received every

day at the office of the Reclamation Service in Washington, from mechanics, farmers, professional men, and others who desire to locate in the West.

Settlement of Reclaimed Lands Mr. Morris Bien, Supervising Engineer in charge of land and legal matters in the Reclamation Service, returned recently from an extended trip through the Northwest. He reports that the work of reclamation generally is progressing rapidly and that there seems to be a feeling of optimism among all classes as to the results.

"On the Minidoka project, in southern Idaho," says Mr. Bien, "the land is practically all settled up. Two years ago the Government gave notice that it could not furnish water until the season of 1907, and the promise will be kept. Water will be turned into the canals this fall, and will be furnished to a considerable part of the project next spring.

"One noticeable feature is the unusually permanent and high class character of the buildings that have been erected by the homesteaders. Some of the settlers have been willing to work for the contractors, and in this way have made a good living while waiting for the water. Others have cleared and cultivated small portions of their entries and have raised small crops of wheat and oats of good quality without other watering than the small rainfall during the spring months. Those who have cultivated their ground have managed to realize sufficient return to enable them to make a living. In spite of the opportunities which have thus been developed a large number of the settlers have made no effort to get work or to cultivate the ground, and it may be that many of them will be unable to hold their entries through the next year.

"Those who are clearing their lands and making the necessary preparations for next season's irrigation will undoubtedly be able to make paying

crops and will be in a position to meet the charges for the construction work, payable under the Reclamation Act, the first of which will become due at the end of next season.

"The developments on the Minidoka project show very plainly that the supply of settlers for the lands made subject to irrigation under the Reclamation Act is ample, and that the man who is willing to work and goes upon the land in good faith to make a home will, in the course of a few years, find himself the possessor of an extremely valuable tract of land as a result of his efforts."

Pennsylvania Work

Surveyors of the State Forestry Commission have been at work on the lines of what is known as the Englebert tract, in the Lykens Valley of Dauphin County, which has been offered for sale to the State of Pennsylvania as a forest reserve.

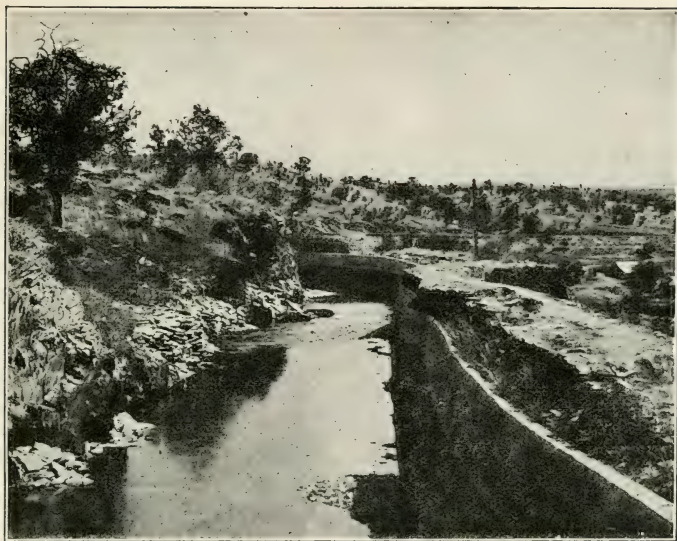
It is expected that a report on it will be made before very long, and, if favorable, it may be bought for addition to the 5,000 acres or so which the commission has in the upper part of that county.

The Englebert tract is owned by an estate, and comprises almost 6,000 acres in Jackson, Williams and Wiconisco townships. It is finely wooded and has numerous streams.

It also lies close to the present reserve. The offer of the property to the State was made some weeks ago, and work was promptly started on the surveys.

Organization Meetings

During the past summer the Forest Service has held a number of supervisors' meetings in various sections of the West, for the discussion of the regulations governing reserve business and the business itself. Such meetings have been held in Colorado, Utah, Arizona, Idaho, Oregon, and Colorado. Each has been attended by the supervisors of the surrounding region. In addition, a number of the



Sidehill Construction on the Bear River Canal, Utah.



Section of Turlock Canal, California.

(Courtesy, Office of Experiment Stations, Department of Agriculture.)

VIEWS SHOWING IRRIGATION CONSTRUCTION IN THE WEST

members of the Forest Service from the office at Washington have attended the conference. At the meeting at Boise, Idaho, for instance, there were present, in addition to a dozen supervisors from Idaho, Montana and Wyoming, the Forester, Mr. Gifford Pinchot, Messrs. Sherrard, Potter, Sterling, Hall, and others from the Washington office of the Forest Service.

First of all, these meetings offer an excellent opportunity for reaching a common understanding of the regulations under which the reserves are managed. Second, they bring into evidence the weaknesses of the present system, so that such can be readily remedied. Third, and one of the most important of all, they improve the solidarity of the Service, in that they bring together the office and field force for a common discussion of common questions.

Undoubtedly, by pursuing this policy of getting its men together, the Forest Service will greatly improve its efficiency.

New Massachusetts Forester

Prof. F. William Rane, formerly professor of horticulture and forestry at the New Hampshire State Agricultural College, has recently been appointed State Forester of Massachusetts, vice Mr. Alfred Akermann, who resigned some months ago to accept the chair of forestry at the University of Georgia, endowed by George Foster Peabody. Prof. Rane has been prominent in the forest movement for a number of years, and is particularly conversant with conditions in New England.

Fewer Fires in California

According to *Pacific Coast Iron and Wood* forest fires in California this summer have been few and far between. If this state of affairs continues during the next few months, 1906 will be a record-breaker. Last year was an exceptionally good year in this regard, and did much to prove the benefits of forest reserves.

One of the most important factors that substantiate the good of the reserves is the prevention and controlling of forest fires by those employed by the Forest Service, a number of whom have been appointed from California. Every year the forests in many counties are destroyed by fire to the extent of many millions of dollars, and coupled to this is an indirect loss, not to the community, but to the nation at large, which cannot be estimated.

Up to within the past few years, little if anything was done to prevent this wholesale destruction; but since the Forest Service has been created and the forest reserves have been managed and cared for by appropriations from Congress, there has been a great decrease in forest fires and the destruction of much valuable timber.

Canadian Association Meeting

The meeting of the Canadian Forestry Association, held at Vancouver, B. C., September 25 to 27, was largely attended and proved to be one of the most successful of the many interesting meetings of that organization. His Excellency, Earl Grey, Governor-General of Canada, gave significant proof of his interest in forestry by his attendance at all sessions on the opening day, and in addition a large representation of mountain manufacturers were present. Mr. Overton W. Price, Associate Forester, U. S. Forest Service, was present as the representative of President Roosevelt, and addressed the convention on the subject of forest work in the United States. Other speakers at the sessions on September 25 were Lieut. Governor Dunsmuir, and Premier McBride, both of whom spoke upon the necessity for forest education for the people in general. Two papers, by Mr. Judson F. Clark and Mr. Roland D. Craig, respectively, "Forest Revenues and Forest Conservation," and "The Management of Forest Reserves," were read at the Thursday morning session, and evoked much interesting discussion. The resolutions

adopted at the Thursday afternoon session cover a wide range, for the most part petitioning legislative action and asking for more rigid enforcement of existing laws relating to the

forests. Special attention is given in the resolutions to the forest fire question, and it is interesting to note, in view of a like resolution passed several times at the meetings of the



White Pine Forest in the Region of the Proposed Southern Appalachian Forest Reserve, Showing Reproduction on Cutover Land. Graham County, North Carolina.

American Forestry Association, that the Canadian organization expresses itself as strongly desirous that forestry be more generally taught in schools and educational institutions.

From this meeting it is manifest that there is a constantly growing interest throughout Canada in forestry and forest conservation. The Canadian Forestry Association is a power for good in the North Country, and the steadily increasing interest its meetings arouse is a significant indication of progress.

Forest Fires in Maine

A correspondent, writing to the *Paper Mill and Wood Pulp News*, gives the cheering information that Maine is getting the forest fire evil under control, and that during the past summer the damage due to fires was small. He says:

"Considering the extremely dry condition of the forests which has prevailed in Maine since early in July, the owners of timber land in the State have been fortunate in escaping with slight losses by forest fires. There have been a number of fires in different sections of the State during this time, but all have been extinguished with slight loss by the fire wardens and the crews employed by the lumbermen, sometimes assisted in the work by timely showers of rain. The danger from forest fires is now almost past. There is still a chance for them, of course, and this is a very bad time of year for a fire to start, owing to the dry leaves on the ground and the withered condition of vegetation in general. The fall rains cannot be a great way off, however, and perhaps before many days the woods will be drenched with rain and all danger of forest fires averted for this year.

"In view of the great expanses of wooded country in Maine and the numbers of campers and fishermen in the woods during the summer it is remarkable that there is not more damage done by forest fires. Every camper and every fisherman is a source of

danger. No matter how careful they may be there are still a hundred and one ways in which a fire may start. Nearly all of the men who go into the woods use tobacco, and this means lighted matches, half-burned matches thrown away and, perhaps, live cigar and cigarette stubs thrown into the dry underbrush, any one of which is potent to cause a forest fire.

"The work of discovering and locating forest fires has been greatly simplified by the establishment of observatories on high points in some of the most thickly wooded sections of the State. There are now five of these mountain fire observatories located on Squaw Mountain, Bigelow Mountain, Whitecap Mountain, Spencer Mountain and Attean Mountain. The men at these stations are provided with powerful glasses with which to detect the smoke of a fire many miles away; charts which enable them accurately to place the location of a fire and telephones with which to summon crews to go and fight the fire. All of these stations have records for the discovery of fires, and in many cases the promptness with which they have reported them has been the means of saving the owners of the lands thousand of dollars.

"The appropriation for the warden service and fire protection is altogether too small. It is only \$10,000 a year, and \$10,000 distributed among eleven counties in which there are valuable timber lands and fire wardens goes mighty quick. That is less than \$1,000 to a county, and when it is considered that there are 160 fire wardens, and nearly all have fires to fight and bills of expense coming in at some time during the year one can readily see where \$10,000 would be used up in short order.

"It is due Land Agent Ring and his assistants to say that the expenditure is very intelligently made and that the service is remarkably efficient for the comparatively small amount of money appropriated for fire protection."

PERMANENT SAMPLE PLOTS*

BY

ALFRED GASKILL

Civil Engineer, U. S. Forest Service.

IN the press of things to be done for the protection of our forests, and later for their proper utilization, the fundamental principle of the forester's craft has necessarily been sidetracked for a time. Silviculture cannot be practised, of course, until the forest is reasonably secure from destruction, but just as soon as real protection and management begin, thought must be taken for the future. Forestry is more than the preservation of existing forests; it is more than the planting of young trees. It rests upon a knowledge of the habits and requirements of trees in the forest—what is called silvics, and the constant application of that knowledge to every branch of forest work. Lumbering may be carried on "conservatively," planting may be done with greatest care, but unless all be done with some understanding of silviculture (the art of producing and tending a forest) the result is apt to be far from satisfactory.

The practice of silviculture in this country has thus far been based chiefly upon the principles laid down by European authorities. But, unfortunately, those principles are often not so universal as they are claimed to be, and are found not work under all conditions. This brings the American forester to the position of finding out for himself the laws that govern tree development and applying them to the problems that confront him. In other words, the science of silvics and the art of silviculture present at once a great field for original investigation and an opportunity to apply the knowledge that is gained. European foresters recognize the fact that their silviculture is based largely upon empirical knowledge. The best of them are now applying the scientific method

and giving the subject a breadth that it has not had. But in the United States, forest problems are more diverse and more complex than they are in Europe. The forests there are simpler (contain fewer species), than ours, unfavorable climatic conditions are less common, and the economic situation permits practises that are not feasible here.

This part of the question admits of no discussion: foresters everywhere concede that what they know of tree growth is limited, and that the time has come to learn definitely and positively the inherent characteristics and requirements of each important species, and, at the same time, to formulate the laws that govern tree associations, that is forests.

As everyone would expect, the Forest Service proposes to take the lead in this work. Many careful studies in all parts of the country will have to be made, and results cannot be expected, in some cases, for years. Nevertheless, the facts that are wanted can be obtained in no other way.

Some of the problems that press for solution are these:

How should a young growth of white pine be treated to produce the lumber of the best grade in the shortest time? There are many stands of second growth in New England to which this applies.

How should a yellow pine forest be cut to insure a good natural reproduction? This applies to many areas now being logged in the South.

What is the best way to handle a mixed hardwood forest so that the more valuable species shall reproduce at the expense of the less valuable?

To what extent can fire be used to help reproduction?

*Photographs through courtesy of U. S. Forest Service.

In the semi-arid regions, what are the relations between moisture deficiency and seed production?

In the same section, The Great Plains, what species are best adapted to planting and what is the proper treatment for each?

What degree of shade does a given species require? How much shade will it tolerate? How do these factors vary with the age of the trees and in different situations? These questions

orable, with the cost and advantage of changing natural types of forest, with the relations that exist between the members of various forest types.

It will not be supposed that work in any direction must halt until each question is answered. Daily work in the forest helps to answer them. Nevertheless, something more is required and the method of sample plots is resorted to. These are called permanent sample plots when they are established



Permanent Sample Plot in a Western Yellow Pine Pole Wood to Determine the Effect of Heavy Thinning.

are vital to the production of forests anywhere, whether the seeding be natural or artificial.

What effect has frost upon the development of a plantation and a forest?

What is the relation of a given species to various soils, aspects, and altitudes?

Broader problems will deal with the possibility of establishing forests where conditions are extremely unfav-

orably maintained in such a way that every change which takes place within them can be observed and recorded.

In practise it is necessary to find a place where every condition is as nearly ideal as possible, and to lay off the plot so that everything affecting it shall be entirely normal. The area is usually rather small, rarely more than half an acre, because it is hard to find larger tracts having the necessary uniformity, and hard to control them.



Permanent Sample Plot. Crown Cover in a Stand that has been Heavily Thinned.
As the Trees Develop the Crowns Enlarge and Close the Openings.

Suppose the question is, "Will western yellow pine in the pole stage grow enough faster after a heavy thinning to pay for the operation?" A piece of forest is found in which the trees are 4 to 6 inches in diameter and stand very close. In that a half acre is laid off, preferably in the form of a rect-

angle, and the boundaries are permanently marked. Then the locality is carefully described, and every fact recorded that can have the least bearing upon the forest—altitude, aspect, kind and depth of soil, humus, and ground cover. Next, the forest itself is measured and recorded. Each live tree

forming a part of the main stand is given a number, calipered at two points perpendicular to each other at breast height, and its height measured. The character of the crown is also indicated. After this a number of photographs are taken from points permanently marked. Next comes the thinning. All trees that are in the way, according to the plan to be followed, are cut out. Those that are left have their numbers put on them permanently with white paint. Thus the exact character and condition of the plot at a stated time is determined.

For the purpose of controlling the experiment another plot is selected beside it, or in a location exactly similar, and treated in precisely the same way except that no thinning is made. At intervals of a few years these plots are remeasured and photographed, and the new record compared with the old.

If the problem be to determine how many pine seedlings are required to make a good stand of merchantable timber, several small plots of different densities would be marked off in similar situations, carefully described, and the seedlings counted and photographed. As growth and natural thinning progressed the plots would be recounted and all changes carefully recorded.

The ways of using sample plots are as infinite as the questions that they will answer. They afford the readiest means of gaining any desired knowledge regarding the growth or behavior of trees, but unless they are made with the greatest care and every fact recorded with precision they will be worse than useless. One who has not a considerable knowledge of silvics, or who is satisfied with loose methods, will accomplish nothing. The sample plot is a piece of the forest, marked out within the forest, or in a situation advisedly chosen for special and prolonged observation and the solution of a definite problem.

The sample plot work of the Service is under the direction of Prof. Graves, of Yale. Thus far about 200 plots have been established, but this is only a beginning. It is intended to enlist the active interest of every field man and to increase the number of plots largely. Especially on the forest reserves will the work be pushed, for there the opportunity to obtain a full understanding of the forest is matched only by the need of it. The Forester hopes to get results of great value from these investigations. A part of them will consist of necessary and helpful knowledge regarding the timber trees of the country, a greater part will be the gradual building up of a real system of silviculture.

THE PERVERSION OF THE MINERAL- LAND LAWS

BY

A. C. SHAW

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EACH effort of the Government to prevent the illegal acquisition of its public lands is met by some new device intended to defeat it. The most recent and glaring instance of the ingenuity exercised to this end is the attempted perversion of the mineral-land laws.

The creation of the forest reserves deprived timberland speculators of a most fruitful field of operation. The law authorizing the creation of forest reserves provides for the prospecting, location, and entry of mineral lands within forest reserves. This wise provision of the law is being used as an

instrument for seeking to acquire illegally non-mineral but timbered areas in the forest reserves.

The law permits an association of eight persons to locate 160 acres of public lands after a discovery of mineral sufficiently valuable to justify exploitation as a mine. The same association of persons can locate as many such tracts as they may discover to contain valuable mineral. After a discovery has been made upon the ground the location is made by filing, in the proper recording office in the State where the lands located are situated, a declaration signed by each member of the association of persons. The locators are given by law the right of possession of any lands properly located, and are not compelled to pay for or seek legal title to the lands while they continue to spend the amount required by law (\$100 per year) for the actual development of a mine upon each 160 acres.

Until the restrictions upon the speculative acquisition of timbered land had been made by the creation of forest reserves and by the repeal of some of the laws permitting speculative entry, the Department of the Interior did not inquire whether a valid discovery had been made as a basis for a mining location until application was made for a patent conveying legal title from the Government to the locators. Evidence of expenditure was held to justify the conclusion that a valid mineral discovery had been made upon the land for which legal title was sought. Parties desiring to secure timbered lands in forest reserves thought they saw, in these provisions of the law and methods of administration, an opportunity to secure control of and title to large tracts of such lands, and, through pretended discoveries and under the guise of compliance with the mining laws, numerous and large tracts of nonmineral land are being appropriated for some speculative purpose.

In Butte and Plumas Counties, California, is located the Plumas Forest Reserve, withdrawn from entry in 1902

and made a permanent forest reserve in 1905. Because of its heavy growth of sugar and yellow pine timber, its extensive water power, and its probable early railroad facilities within forest reserves, it presented the most tempting field for the development by the speculators of this scheme of acquisition. Its undoubted mineral wealth, shown by past and present mining operations, made the perversion of the mineral land laws the most plausible scheme for acquisition and monopoly of large quantities of timbered land or land surrounding water power, although only a small proportion of such land can be, by any possibility, shown to contain mineral. One party has, with the assistance of seven others, some of whom are in his employ and others under his control, made locations of approximately 280,000 acres of heavily timbered land in this forest reserve.

The suspicion of fraud suggested by their extensive operation may be understood by recalling that the first real mineral land law was enacted in 1866, and since that date there have been sold by the United States under it and the amendatory or enlarging act of 1872, less than 200,000 acres in the entire State of California; less than 300,000 acres in Colorado; less than 150,000 acres in Montana; less than 75,000 acres in Utah; about 50,000 acres in each of the States of Oregon and Idaho, and less than 40,000 acres in Nevada, New Mexico, Washington, and Wyoming, respectively.

The lands in the Plumas Forest Reserve covered by the locations referred to have been subject to mineral entry since the enactment of the mineral-land laws, and the lands located are interspersed with mines practically all of which have been abandoned. The locations have been distributed throughout the years 1902 to 1905, inclusive, but no mining has been done upon them. The locators are not miners and the selections were made by timber experts. It seems probable that one of the prime objects of these locations was to protect a proposed

right of way for a transcontinental railroad, which is now in course of construction across the forest reserve and across many of the locations. The controlling locator was connected with the railroad when the locations were made and assigned the right of way to it. When the construction of this railroad is completed there will be a public demand for the matured timber.

Another man claims approximately 20,000 acres of land in the reserve under mining locations made in similar manner, and for the apparent purpose of enabling him to monopolize the most desirable and valuable water power.

Following its policy to make the forest reserves contribute to the development of the sections of country in which they are located and to supply the sectional timber demand, and to prevent monopoly of the resources of the forest reserves, the Forest Service found it necessary to take steps to annul such locations as are clearly illegal. In a mineralized section, as parts of the Plumas Forest Reserve undoubtedly are, injustice and harm to actual miners and actual mining development can be avoided only by the most conservative action.

At the request of the Forester, the Secretary of Agriculture laid the situation in the Plumas Forest Reserve before the Secretary of the Interior. The latter has determined that his Department has legal power to determine the validity of a location before the locator files application for patent in the land department. A corps of geologists has been detailed by the Secretary of the Interior to examine the ground embraced in the locations to determine whether or not a proper discovery had been made and whether or not the requisite amount of development is being done. The evidence gathered by these geologists will be made the basis of a hearing before the land department, and any locations found illegal will be declared invalid. It is to the interest of legitimate prospectors and miners to support the efforts of the Government to prevent

one person or set of persons from appropriating vast quantities of land under pretended color but really in defiance of the mineral-land laws. The resources of the forest reserve are open at all times to persons actually prospecting or developing mines, and forest officers are instructed to encourage, assist, and protect actual mining.

Wholesale and illegal mining locations not only cloud the title of the Government and prevent the public sale of matured timber from forest reserves, but they encourage monopoly of resources which could be most naturally and beneficially developed by varied interests. These locations also retard legitimate mineral development, since they make it necessary for legitimate miners, desiring to locate and actually develop any of this land, to prosecute extensive contests against illegal claimants. By illegal locations which have not been regularly brought before the Department of the Interior, legitimate development and use of the public land is discouraged. Stock companies, based upon fraudulent mineral land locations, are formed and stock sold to innocent persons, who are unaware of its illegal basis. The situation of the Plumas Forest Reserve is duplicated upon surveyed, and especially upon unsurveyed, public land not in forest reserves, and the action which is being taken in that reserve will be followed by similar action in others, and legitimate claimants to unreserved public land also may hope to secure the annulment of illegal mining claims for such land, and its subjection to a proper and legal use. The mineral-land laws undoubtedly have certain defects and were enacted under conditions which have changed, or to some extent disappeared, but they were always intended to foster legitimate mining developments, and to provide for perfection of title under legal discovery only. As has been found with others of the public land laws, the executive officers have been given ample opportunity to detect and prevent fraudulent and illegal acquisition of public lands. A

vigorous execution of the present law will protect the public domain and the legitimate miner. The co-operative investigation on mineral-land claims by the Departments of the Interior and of Agriculture, now in operation, insure such execution.

When it has been found that a cloud has been fraudulently placed on the Government's title to the public land, the persons responsible should be held liable for the expense which their illegal efforts has forced the Government to incur.

FOREST RESOURCES AND THE PUBLIC WELFARE

An Address Made Before the Annual Kentucky State Development Convention, Winchester, Kentucky, October 12, 1906

BY

HERBERT A. SMITH

Editor, U. S. Forest Service

WE have lately passed through a half century of industrial development almost unparalleled in human history. In 1850 our population was 23,000,000, in 1900, 76,000,000. In 1850 our farm acreage was less than 300,000,000, in 1900 over 800,000,000 while the value of our farm property was less than \$4,000,000,000 as against over \$20,000,000,000 at the latter period. Our manufactures make a still more remarkable showing. The wage earners employed have risen from one to five millions, while the capital invested multiplied twenty times in the half century—from \$500,000,000 to nearly \$10,000,000,000. It is chiefly within this half century that our railroads have spread their network over the land, and steam has revolutionized the whole world of industry. In brief, then, these fifty years have seen an immense expansion of agriculture coupled with the sudden growth of a colossal manufacturing interest, and naturally along with these an accompanying development of transportation.

Who can doubt as we seek to read the future in the light of the present, that the first half of the twentieth century will see a progress equally

notable. By 1950 we bid fair to be a nation of 200,000,000 souls. We have covered the land with our farms, yet it is now apparent that we have no more than scratched the surface of its productive power. By the use of irrigation we may plant empires in the desert, while by improved methods of cultivation we have it in our reach to increase the yield of our present farms many fold. Our manufactures are still increasing at a rate that staggers the imagination to keep pace with, and instead of having to supply our needs from other countries we are invading the markets of the world. Electricity promises to rival in the next half century the marvels which steam wrought in the last, while our vast supplies of iron and coal, the two main pillars of present-day industrial supremacy, insures us such an immediate future as no other nation can hope to rival.

Yet there is another class of considerations which demands our attention. One of our most sagacious men of affairs has lately been calling to our notice the danger of exhaustion of many of our resources upon which prosperity depends. The very rapidity of national growth of which we

are assured—which we can not escape—enhances the danger. By the end of the half century our vast deposits of iron will (so it is said,) under the accelerated drain, have been very largely reduced. Our dwindling forests have already begun to harm the industries dependent on them. Our coal, the chief source of the power which drives the wheels of industry, can never be burned but once. Can it be that the vast rising structure of our industrial life is consuming its own foundations and is doomed to eventual downfall?

That same sagacious man of affairs to whom I have just referred—Mr. James J. Hill—has pointed out the distinction between our lasting and our transitory sources of prosperity. Our farms belong in the first class; our mines in the second. Every ton of ore taken from our mines is like money drawn from a bank account; when it is used it is gone. For stable and permanent prosperity, if our national greatness is not to fall into an early decay, we must look to those sources of wealth which are capable of utilization without impairment of their productive power.

There is a fundamental difference between utilization and exploitation. Mere exploitation brings temporary enrichment followed by permanent impoverishment. Exploitation is too often regarded as development. True and lasting material development depends on our learning to make the most of every natural resource. Underdeveloped, our resources are but potential wealth. The greatness, prosperity, and power of our country, and with them our own individual welfare, depend on our learning how to utilize to the fullest every natural resource.

Of these natural resources our forests constitute one of the greatest. Hitherto we have abused this resource shamefully. We have exploited it. With the prodigal recklessness born of abundance we have taken what we needed and destroyed much more than we have used. It

is now plain that the day of reckoning is not far distant. Not our children, but we ourselves, are likely to have brought forcibly home to us the evil consequence of our shortsightedness.

In this problem forestry plays an important part. A considerable portion of our land is by nature fitted to serve its best use as a source of permanent supply of wood and water. In mountainous regions wood is the only crop which the soil is capable of producing, but it is not merely in the mountains that the natural forest land is to be found. Even in our richest agricultural regions there is usually to be found more or less land too rugged, steep, wet, or infertile for agriculture. Eventually the woodlots of the American farmer will furnish us with a large part of our wood supply.

The Department of Agriculture exists at Washington to promote the best use of all kinds and classes of the land which forms our greatest national asset. The problem is essentially the application of the highest intelligence and fullest scientific knowledge to the work of making our land yield its utmost. The Department of Agriculture seeks for the farmer new crops, better seed, better methods of cultivation, improved methods of breeding and caring for stock, information as to how to market his product—whatever can make his farm more profitable. In doing this it is adding enormously to the capital value of farm lands.

It is no new statement, but yet it is one that can not be made too often, that wood is of basic importance in our industrial life. Other materials can not do away with the need of it. There is no great industry for which it is not important.

Take the case of Kentucky. More than one-half of her area is wooded. Lumbering adds yearly to the wealth of the state an amount which places it second among her great industries. Yet this is only a beginning. Kentucky is rich in coal, but coal can not

be mined without a large supply of mining timbers. In many places the coal mines have already largely drained their supply of timber, and the management of Cumberland Mountain forests for the production of such timber will probably furnish their best employment, and will be necessary in the interest of the mines themselves. The same thing is true of the railroads. Every tie laid in the track requires on the average two trees growing in the forest to keep it there. Through the northern part of the state the production of railroad ties from timber tracts and woodlots will assuredly be one of the most profitable ways of utilizing the forest, and special studies along these two lines, mining timber and tie production, in these two different parts of the state, would therefore be of great value. By far the greater part of the lumber produced in Kentucky is hardwood, of which oak constitutes a large part. Upon the supply of this depend many industries. Distributed through the state are to be found vehicle factories, handle factories, tight and slack cooperage plants, box factories, veneer mills, and wood distillation plants. The manufacture of carriages and wagons alone represents an aggregate investment of over \$4,000,000. The cooperage industry in Kentucky produces more tight barrel stock than any other state in the Union.

Forest destruction is already threatening the future of these industries. Recent reports from the National Tight Barrel Stave Manufacturers' Association show that their timber to-day is costing nearly four and a half times what it did 10 years ago. The handle factories of Kentucky use large quantities of hickory. Only this week the papers announced that the scarcity of hickory timber was the chief subject of discussion at the opening of the annual convention of the National Association of Implement and Vehicle Manufacturers. These manufacturers see the need of the supply of hickory already in sight.

Industrial development throughout the South is now recognizedly dependent in large measure on the development of the water power furnished by the streams descending from the Southern Appalachians. Forest destruction has already sensibly begun to affect these water powers. A measure to establish a national forest reserve which will put a stop to this destruction and benefit at once the consumers of wood, the users of water power, the agricultural interests affected by the floods in inundation, and the harbors and navigable inland waters now injured by the deposits of silt and sandbars, was passed by one branch of Congress at its last session and now awaits the action of the other branch. From the Forester's standpoint there can be no question that this legislation, if enacted, will beneficially affect the development of every state which borders on the reserve. It is to be hoped that this reserve will include some part of Kentucky.

But the state needs more than action by the National Government. If her forests are to play their proper part in contributing to her welfare, the private owner must be informed before it is too late how to make the most of what he has. The forests must not be left to take care of themselves. Trees are a crop as truly as corn and tobacco, and must be cultivated by the methods which will bring the largest yield. Of these methods the ordinary owner, particularly the small owner, is ignorant. He is ignorant also of how to dispose of his property to the best advantage. The large owner can generally be depended upon to take care of himself. A wise state forest policy might well begin with a study of existing forest conditions and existing markets, which would throw light on the important problems of management. Such studies have already been made in other states, notably New Hampshire and California, in co-operation with the Forest Service of the National Government, which stands ready to co-operate with any state by sending

its experts to conduct such a study. After the study is made the way is clear for full formulation of the policy which will best serve the interests of the state.

The last resort, public opinion, the intelligent interest of the citizens, is the force which, if brought to bear, will work the greatest good for the forests of Kentucky. To inform and strengthen this interest in forest problems every channel of information should be opened.

This campaign of education is needed to secure certain definite, practical results. The essence of the matter lies in a nutshell. Over one-half of Kentucky is wooded, and most of this land can have no permanent value except to produce wood, which the

manufacturing interests of the State cannot do without.

The question is, shall much of the State be permitted to become waste and worse than waste land, untaxable, stripped and abandoned and pouring down ruin from its gullied and washing slopes, and shall much more produce only a scant and inferior yield of material worth less for the wood-working industries and hardly worth cutting, or shall every acre of the commonwealth contribute its share to the general welfare and its full profit to the owner, yielding its present harvest of mature timber without injury to the younger growth, and intelligently directed to the production in largest possible quantity of the best paying and most needed kinds of wood?

THE DINKEY GROVE OF BIGTREES*

One of the Little Known Groves of Sequoias

BY

JOHN D. GUTHRIE

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ONE of the smallest, most isolated, and least known of the ten groves of big trees in the state of California is the Dinkey Grove of Fresno County. There is practically no published information in regard to it beyond being included in a list of big-tree groves in "A Short Account of the Big trees of California," Bulletin No. 28, of the Forest Service, with the comment that very little reliable information was obtainable in regard to it, and that it was said to have been discovered by two hunters in the early seventies. The grove has been given the name of "McKinley Grove" by the U. S. Geological Survey engineers when they made a contour map of this region a few years ago, but the grove is still locally known as the Dinkey Grove.

The grove is located in Section 35, Township 10, South, Range 26, East, on a small stream emptying into Din-

key Creek, a tributary of Kings River. It is situated within the Sierra Forest Reserve and is under Government ownership. The grove, though small, is the only one to be found between the Fresno Grove in Madera County and the Tule River Grove in Tulare County, and is the only Government-owned grove between the Sequoia National Park and the Mariposa Grove, and the interest manifested in it by residents throughout that region is considerable. As an evidence of this interest it may be said that during the four days spent by the writer within the grove it was visited by over thirty persons. The grove may be reached by the stage from the town of Fresno to Ockenden post office. From here a road leads to Dinkey Meadows, from which point a good trail is found to the grove.

The grove is situated in a slight depression, on a bench, on the south-

*Illustrations through courtesy of U. S. Forest Service.

east slope of a ridge, having an elevation from 6,800 to 7,300 feet above sea level. The total number of Sequoias in the grove was found to be 170, and these are scattered irregularly along the gentle slopes on either side of the small streams flowing through the grove, the entire grove covering an area of some 50 acres. The stand is composed almost entirely of large, old sequoias; only in three restricted localities is any young growth to be found and this ranges from seedlings a few inches in height

tree, is the cause of the scarcity of sequoia reproduction within the grove. This was clearly shown in one locality where a fire had destroyed the fir and pine on an area of a few square rods and here, on a plat $16\frac{1}{2}$ feet square, 550 sequoia seedlings were counted, from two inches to one foot in height. Two other patches of sequoia young growth were found, one of sapling growth from 4 to 15 feet in height, scattered among a fairly dense cover of chaparral, but overtopping it and making good growth. The other lo-



Reproduction of Bigtrees, Averaging 3 feet tall and 15 years old. Grown up after Fire. Dinkey Bigtree Grove, Sierra Forest Reserve, California.

to pole growth with diameters of 8 to 18 inches. The large sequoias are found as single trees, in twos, or in groups of three or more. In one case a group of seven large trees is found growing very near together and the group has been named "The Pleiades."

With the bigtrees, forming an understory, is found a large quantity of sugar and jeffrey pine, white fir and a small quantity of incense cedar, ranging in height from 100 feet to 150 feet. The density of this growth, together with the intolerance of the big-

cality contained much larger growth, from 6 to 20 inches in diameter. In all three cases these stands were found in small openings among the fir and pine.

Seed of the bigtree in this grove seems to be borne in abundance, judging from the large number of cones beneath the trees, but, owing to the heavy litter on the ground and the shade of fir and pine, the species can succeed in germinating and getting started only in the very few, small, open spots within the grove. On the

other hand, the reproduction of white fir and pine is good throughout the grove.

Undoubtedly the original stand in the grove was of sequoia; the white fir, sugar and jeffrey pines have succeeded in getting a footing and are slowly crowding out the sequoia and will eventually form the stand unless

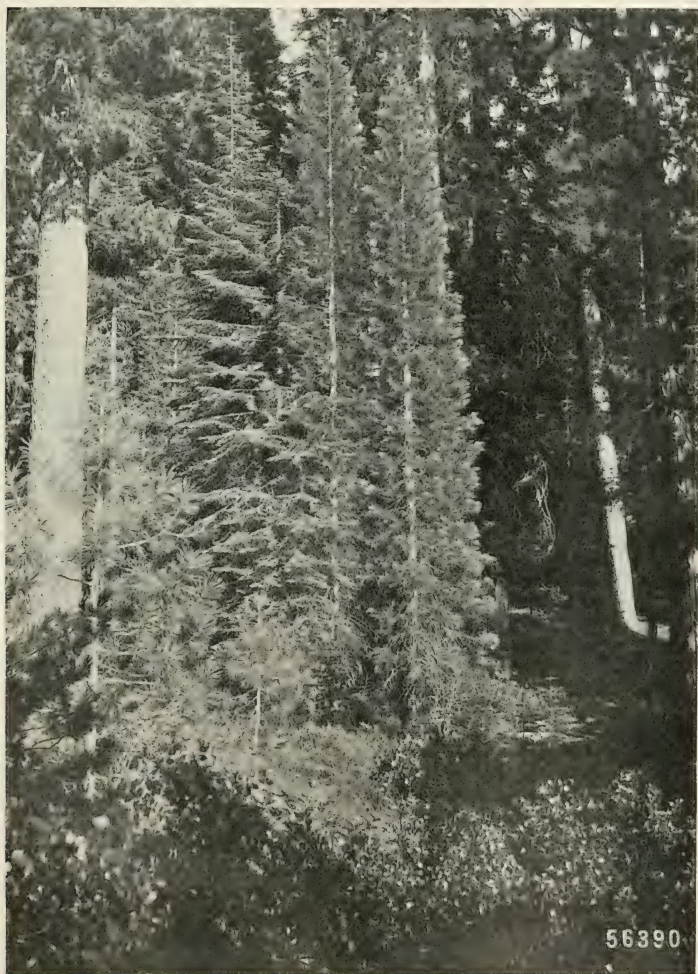
something is done to bring about conditions suitable for the natural restocking of the bigtree. This could be accomplished by cutting, to a large extent, the fir and pine in the grove, thereby opening up the stand and letting in more light, which is essential for the growth of the bigtree. The large specimens of the sequoia are in



Two Pole Bigtrees of Fine Growth in Dinkey Grove.

many cases on the decline, as is shown by the stagheaded condition of the tops. Old fires have injured many of them very severely, but, if the natural records are to be believed, there seem to have been no large fires within the grove since 1876, which date is plain-

ly legible, carved on the trunk of the largest tree in the grove, known as "General Washington." There have been small fires, notably one about fifteen years ago, which killed a large sequoia, the hollow shell of which now remains and around which some young



Two Fine Young Sapling Sequoias, Growing in an Opening Along the Bank of a Creek Flowing Through the Dinkey Bigtree Grove.

growth has started (see illustration). There is a forest reserve rule against camping or building fires within the grove, but owing to the large amount of territory to be covered by the forest rangers this rule cannot always be enforced, as it would be impossible for them to keep a close watch over the grove.

"General Washington," the monarch of the grove, has a diameter of 21 feet at a point seven feet from the base and has been severely burned by several fires in the remote past. Other

large specimens in the grove are "Old Defiance," with a diameter of 17 feet, eight feet above the base; "Fresno," with a diameter of 18 feet, eight feet above the base, a clear length of 74 feet and a height of 243 feet, (has been injured by fire); "The King's Throne," 16 feet in diameter at breast height, has clear length of 105 feet and a height of 264 feet. Many of the largest trees have placards on their trunks bearing names, such as: "James R. Monroe," "The Lady Laura," "The Lady Bertha," "Ruth Cleveland," etc.

WORK OF THE AMERICAN FORESTRY ASSOCIATION

BY

THOMAS ELMER WILL

Secretary of the American Forestry Association.

IF the American forests are to be saved, the work must be done by human agencies. Of these, the chief are two in number, the Forest Service and The American Forestry Association. The first is public, governmental; the second, private and voluntary.

That two such forces should exist is well. What is impracticable for government is often entirely within the scope of private initiative; while tasks before which private efforts fail may be easily attained by an entire people co-operating through the central organ they, for convenience, designate as their "Government".

With a new and fitting name, and with field and powers vastly enlarged, the Forest Service is striding forward in seven-league boots in the performance of a task essential to the Nation's life. Yet "Government" cannot do all. No stream can rise higher than its source; neither can a government—especially a popular government—long maintain a policy not favored by the people. For this reason, if the Forest Service is most truly and fully

to perform its function it must constantly feel that it is standing upon the solid rock of an approving public sentiment.

The chief agency for developing and educating this sentiment should, naturally, be a voluntary organization, composed of those in sympathy with the end sought. Such an organization is the American Forestry Association. During its life of twenty-four years it has stood at the forefront of the Forestry Movement, holding meetings, distributing literature, diffusing intelligence, arousing interest and pressing for needed legislation.

Within recent months a special effort has been made to increase the membership of the Association. Members include annual or active, sustaining, and life, and, also, patrons. Active and sustaining members pay, respectively, \$2 and \$25 per annum. Life members and patrons pay, respectively, \$100 and \$1,000 each, once for all.

The chief income of the Association is derived from payments by members; an additional source consists of direct

contributions; these, however, are few.

The great work immediately ahead of the Association is the passage of the bill establishing the Southern Appalachian and White Mountain forest reserves. In the last session of Congress, this bill passed the Senate and was favorably reported from Committee in the House. It is understood that a clear majority of the members of the House favor its passage. What now remains is to provide the opportunity for the members to vote upon it. This opportunity is controlled, nominally, by the House Committee on Rules; actually, by the Speaker. If the latter can be induced to permit the bill to come to a vote its passage is practically assured. The Association will exert itself in the coming session to effect this end.

Just beyond, however, lie other worlds to conquer. Desirable as is the White Mountain and Appalachian bill, it is for the East but a beginning. "Reserves," unhappily so called, now dot the western mountain regions. They should, likewise, abound in the east. As President Roosevelt well declared at Raleigh,

"All the higher Appalachians should be reserved, either by the states or by the Nation;" and he wisely added his express preference that "they should be put under National control." This foreshadows a long and arduous campaign.

Further, the work of extending the reserve system in the west should be continued. More reserves are needed, not only in the mountains, but in the semi-arid region. A beginning has been made, as in the Dismal River region of Nebraska and at Garden City, Kansas, where federal tree planting is in progress. A vast work, however, remains to be done in all this area.

Friends of the forest, rally to the standard! If not already members, join the American Forestry Association. Aid it by your dues and by your influence. If members, present the needs of the work to your friends. Distribute its literature. Point out the need of active, intelligent, organized effort. Swell the rising tide of sentiment, which alone can save our forests from the despoiling hand of the exploiter and transmit to our children the heritage which is rightfully theirs.

IRRIGATION LEGISLATION IN THE WEST

BY

MORRIS BIEN

Supervising Engineer, U. S. Reclamation Service.

THERE is much activity at the present time in the States of Montana, Oregon, and Washington, with a view to securing legislation on the subject of water rights and irrigation from the legislatures of those States during the coming winter.

This subject has received much attention during the last few years in the western States, and in several States a considerable advance was

made in the legal conditions upon which the use of water will depend.

Until the passage of the Reclamation Act, four years ago, the Federal Government did not come into direct contact with the laws of the States upon this subject, but since the United States has begun the construction of irrigation systems in a number of the western States, the necessity of definite action to improve the legal condi-

tions which hampered speedy and secure investment by the United States, was impressed upon the attention of the legislatures of the States. The message of President Roosevelt at the beginning of the Congressional session in which the Reclamation Act was passed, had forcibly presented the unsatisfactory conditions in some of the States.

This message was doubtless the first Presidential message to Congress containing a discussion of the state laws relating to irrigation. In a few incisive paragraphs, President Roosevelt stated the fundamental principles which should underlie such legislation and pointed out the fact that in a number of States decisive action was necessary in order to place their laws upon a proper basis.

It is true that a modification of the irrigation laws would eventually have been compelled by the force of circumstances. But there can be no doubt that this vigorous discussion by the President and the passage of the Reclamation Act, which is also due largely to his efforts, has caused these changes to be made in several States much earlier than if the necessity had not been so presented by the President's energetic statement.

The fundamental ideas are that the waters of the western streams are of but little value while they flow in the streams, and that most of the lands now belonging to the public are of no value without the application of the water. Separately the two are of no benefit to the country or to civilization, while if the water is brought upon the land, the development of a magnificent civilization upon the former desert becomes possible.

In several of the States of the West the legal conditions have interfered seriously with the bringing together of the land and the water. This situation was recognized and many efforts were made from time to time to secure the necessary modification of existing legislation, or further legislation to meet the inadequacy of the existing statutes.

This need has been felt especially in the States of Montana, Oregon, and Washington, and vigorous efforts two years ago secured special legislation to facilitate the operations of the Government in those States. This has been of some value, but the work of the Government must remain hampered by the statutory conditions upon this subject, so long as no general system is in force in harmony with the principles recognized as necessary by modern practice.

Immediately after the passage of the Reclamation Act, surveys and investigations were commenced by the United States, with a view to the construction of irrigation works in the various States and Territories mentioned in the law. Prior to the legislative sessions of 1903, the Reclamation Service was asked to suggest legislation in order to meet the obstacles found in some of the States on account of the existing laws concerning water rights and irrigation.

It was felt, however, by the officers of the Service that there had not been sufficient practical experience to warrant any suggestion upon this question. Two years ago, however, preceding the legislative sessions of 1905 in the various States, in reponse to urgent requests from representative bodies in several of the States, particularly in Washington and Oregon, a draft of a State irrigation code was prepared by the Reclamation Service as a suggestion to the commissions engaged in preparing recommendations for the legislatures.

This draft was carefully considered in a number of the States and Territories and was adopted without substantial change in the States of North and South Dakota and in the Territory of Oklahoma. In Oregon, Washington, Montana, New Mexico, and others some features of this draft were adopted.

There is now a renewal of interest in this matter and commissions in Montana, Oregon, and Washington are again considering the proper form

of recommendations to be laid before their Legislatures at the next session.

It is to be hoped that definite progress may be made in each of these States, for it will not only facilitate the work of the Government, but will also open the way for the more secure investment of private capital in the development of irrigation works in all these States.

Legislation which will enable the claimants to the use of water to make their rights as definite and certain as the right to the ownership of land, cannot fail to encourage the investment of

private capital, which has been more or less timid in the past of the difficulty in determining accurately the extent and nature of the rights to the use of water upon which enterprises for irrigation, water power development, etc., must necessarily depend.

The commissions engaged upon this work are composed of men standing high in the community as irrigators, business men, and lawyers and they can do no greater service to the State than to aid in securing improvement in irrigation and water right legislation.

RECREATION AND THE FOREST

MEN work that they may enjoy leisure, and make money in order to spend it. This is not, perhaps, the normal and proper state of affairs, and it may be that work for its own sake should bring rewarding enjoyment. But as the world goes, work may mean overwork, or work without real choice or aptitude, so that what might otherwise be a pleasure is too often a dry task. Recreation, therefore, though it takes up but a short span in the course of a lifetime, is cherished in proportion to its brevity. If the world had no natural recreation grounds the ordinary man would lack incentive to labor except to supply the bare needs of existence. For the play instinct, the delight in free activity for its own sake, especially in the great outdoors, is as old as the race and one of its best inheritances from its prehistoric ancestry.

The forest is the most ancient and momentous of human dwelling places. Ever since men, in caves and trees, learned, even among dangers, to regard the forest as a home, the shadows, the silence, the excitements, and the fascination of the forest have stirred the strongest feelings of the race. Dread of the forest, its incentive to achievements, the sense that within it all things good and evil were to be

found and treasured or encountered and overcome, have left an indelible impress in the minds and hearts of men.

In primitive days, when the business and risks of life were over for the day, the stern and impressive realities could be rehearsed by the hunter and his children in the mimic world of play. Nowadays, the ordeals of our forest ancestors have become all play. Hunting, picnicking, canoeing, fishing, tramping, the tent life and the roaring camp fire, are all survivals of the life of the Forest Age, reminiscences coursing in the very blood of our civilization and carrying us back to the times when danger was a part of the day's work and successful craft against bird and beast and fish was the first condition of existence. Recreation in the forest is the pleasant recall, in imagination, of a life vivid, fresh, free, and heroic. This life, now lost to us in the humdrum barter of the market place, may be brought back by the power of money, to amuse and invigorate and thrill us yet in our short hours of leisure and liberty.

How highly this reversion to the old life is treasured may appropriately be measured, in these times, by the sacrifices men make, the money they

spend, for a summers outing beside forest and stream. In New Hampshire, for instance, about half a million dollars are spent each year by the summer visitors, whose choice of this region is based upon its fine woodlands and lakes. Of the 174,280 persons spending their summer there, in the latest year for which figures are at hand, only about one-tenth (20,352) occupied cottages for the season, while a third remained but a week or so, and more than half (95,706) remained less than a single week. The cash received from these people, in the same year, was almost \$5,000,000, and the total amount of this business added to the capital invested in summer resort property exceeded \$10,000,000.

Had the forests been destroyed or disfigured by wasteful logging, probably not one cent of this large income to the state would ever have been spent. Common sense, not sentiment, must make the strongest protest against any use of the New Hampshire forests, save one consistent with retaining forever the attractive power of the whole region for those seeking recreation. Of course, this "summer people" revenue is only a subsidiary affair in a business sense. The forests are chiefly valuable there, as elsewhere, for their ability to supply use and profit in the concrete of wood products. But the two values, the commercial and the pleasurable, may be secured together. The farmer whose yearly income is greatly augmented by the recreation his guests are sure to find in the forest which he owns, need not withhold the ax altogether. His woodlot may be made to pay by oft-repeated cuttings which yield wood for home use or for market, without so thinning the stand as to mar the shade or pleasantness of the picnic grounds. Besides, by clearing the woodlot, though the first returns would be greater, he would have

to wait long for further revenue; not only would he, in effect, turn away the paying guest, but he would discount the future.

Rules for the farmer's woodlot management in this region would be to avoid cutting of any kind during the summer outing season, to have strips of woods along the roads, to leave undisturbed the favored picnic grounds or places of special interest, and, in general, to avoid as far as possible, the clear cutting of any tract.

The same principles hold true even more emphatically of larger lumbering operations. These should go on; they yield a good part of the state revenue. But if pushed recklessly, as too often in the past, they will not merely invite their own end, but will put a stop to the quest for recreation in the New Hampshire hills. Moderation, wise and foresighted lumbering, will preserve both the direct and the indirect sources of revenue, and time will constantly add to their amount.

All this, which applies to the pocketbook alone, is important enough to lead to wise action without further discussion. But there is a broader argument of general policy which may be used in defense of the New Hampshire forests. Recreation grounds in the East are limited. More and more, as the cities swell, and the pressure of industrial life becomes severer, it is of the highest common concern that nature be safeguarded and encouraged in her beneficent work of building up and sustaining the great world of Recreation, in which care is thrown aside and cramped limbs, bent shoulders, and weary brains may find freedom and invigoration. The forest for recreation has become a much needed investment in the interests of the whole community.



TELEPHONES AND THE FOREST RESERVE*

BY

BRISTOW ADAMS

Expert, U. S. Forest Service.

AMONG the newer and more unique uses of the telephone is one that has received Government sanction in connection with the administration of the Forest Reserves. The installation of telephone service in the national forests, where there is necessarily much isolation, is counted on not only to prove of great convenience to those engaged in the administration of these tracts, but also to save many thousands of dollars, and perhaps even many lives.

In the first case the telephone will serve the same uses as it does in the big agricultural stretches of the West, where it has been a potent factor in relieving the rancher and his family from the terrible nervous strain of an enforced isolation. It has even been claimed that insanity has decreased among farm women since the telephone has come into rural use. Then also the convenience in the transaction of general business between farmers, and with the general public has meant many reforms and the saving of incalculable time. These things being true in respect to rural districts, how much more are they true of the telephone in its relation to the forest reserves and the daily life and work of the forest ranger and his family absolutely isolated from their fellow beings, in some cases dwelling at least fifty miles from the nearest settlement, and twice that distance from the headquarters of the forest Supervisor whose consultation and advice is often needed. Then, too, the general public in or near forest reserves has to do business with reserve officers and the telephone in a moment can obviate the necessity of a day's

journey, and a journey that may be, and often is, fraught with danger.

But it is in cases of emergency in the forest that the telephone becomes the instrument of salvation; and no greater emergency is likely to arise than that engendered by the most serious menace to the forest and to forest life—fire. The prevention and control of forest fires is the most important and the most difficult work that confronts the forest reserve force, since fires annually cause more loss than all other destructive agencies combined. Forest fires in the United States each year consume property to the value of one-tenth of the entire forest product of the country. Moreover this immense record of destruction takes into consideration only such immediate loss as may be calculated or approximated, and cannot measure permanent losses to the forest, and to the resources dependent upon it.

Forest fires, generally speaking, cannot be coped with after they have become fully started, and sweep over the country without meeting any resistance, destroying everything in their path and wiping out life and property. In brief, the only possible way to control fires is to prevent them, or reversing the recipe for rabbit pie, the idea is, not "first catch your fire," but "catch your fire first." In this catching of the fire in its inception, the telephone plays an important part. A single example will suffice: A forest ranger in the California mountains leaves his cabin in some secluded valley to take up his round over the part of the reserve under his immediate control. His trails are well kept, his telephone is in order, with call boxes

*Reprinted through courtesy of *The American Telephone Journal*.

arranged every few miles along the paths and fire lanes. He comes upon a place where a party of campers or prospectors have left their camp fire without stamping it out. In the interval between their departure and his arrival a ground fire in the dry forest carpet has become too large for him to cope with alone, though his efforts may be able to check it for a limited time, particularly in its most dangerous direction. In such a case he can remain to fight the fire to the best of his ability and hold it in check until help from the Supervisor, or other rangers with a suitable force, can arrive from a distance.

The picture is not so pleasant if it is drawn from an instance where the telephone system is lacking. A fire breaks out in a district remote from any help. The ranger may discover the blaze after it is beyond the control of a single man, and assistance must be secured before there can be any hope of effectively stopping it. But his district is a day's ride from a settlement, maybe two or three days' ride from the Supervisor's headquarters. There is a choice between the two courses of action, both of which are almost hopeless. He may try to hold his ground and work in utter futility to stop flames that readily get beyond his control. If he leaves at once for help, some days may elapse before he gets back with men and fire-fighting tools. During his absence the wind may have arisen and he returns with his force to find thousands of acres burned over, and the men at his command practically as powerless against the larger fire as he was against the incipient one.

These two contrasting cases will serve to show instances where the telephone would be valuable. Even a fire of some severity at the outset can be held in check by one man, especially if he is working, not with the idea of a hopeless task to be grappled with alone, but buoyed up with the certainty that he is to do his best until he gives way to a sure and effective relief. The mental attitudes under the

two conditions must be considered as important factors, because a man will work harder, longer, and with less fatigue if he sees a relief or a reward ahead. It has been stated that the boy who held his hand in the dyke crevice through a long night's vigil could not have done so had he not been sure that dawn would bring the Holland villagers and relief. Without reflection on a ranger's courage and tenacity, it is safe to assume that he would be less likely to fight long and hard to combat a fire if he felt that the struggle were not only hopeless but endless.

The use of telephones on forest reserves is not a suppositional nor a merely contingent matter. They have been tried and proved by time, and although the Government has no telephone service of its own in operation, there is one under construction in the Big Horn Forest Reserve in Wyoming, where the first line will be 109 miles long, connecting the rangers' cabins in the reserve with the Supervisor's headquarters at Big Horn.

The preliminary work was done by an expert in telephone construction detailed from the United States Weather Bureau, and the material has been purchased. Actual construction was to have been begun in the spring, in order that the line might be available for the protection of the forest during the season when fires are most prevalent. It was held up until later, however, on account of the fact that the appropriation did not become available until the first of July. The construction cost, it is estimated, will average \$30 per mile, or about \$3,300. The total cost of supplies for the line, exclusive of instruments, which are to be leased from the Bell Telephone Company, amounted to \$2,400 laid down at Big Horn, Wyo. The wire was obtained from Du Perow, of Washington, D. C., at a total cost of \$1,897.50, and the insulators, brackets, and kindred equipment from the Electric Appliance Company of Chicago. The construction of still another telephone system was authorized under the Government, providing for

five miles of Government telephone lines on the Pikes Peak Forest Reserve in Colorado. Construction on this line was begun as soon as the appropriation became available at the beginning of the present fiscal year.

The comparatively low cost of such lines, owing to the presence of poles on the ground, and even the use of standing trees, is one of the things which will contribute to their extension.

Supplementing the proposed Government telephone lines are a number of private lines constructed under permit from the Forester, who grants a right of way across a forest reserve only on condition that the forest officers shall be allowed free use of the line for official business. So far there have been permits granted to nineteen individuals or companies for an aggregate of more than 140 miles of line, which may be used for the protection of the forests in several different localities.

Upon the success of the Government lines under construction will depend an extensive adoption of telephone systems on all reserves, though it is already established and understood that their use is attended with excellent results. It is probable that in winter these lines will suffer considerable damage, but as this is the time when there is likely to be no demand for their use no serious difficulties will be experienced. In the spring a few days' labor will put them in order.

The details to be considered in laying out these forest lines will vary more or less in different localities, but in general will be determined partially by the contour of the country, and perhaps to a larger extent by the location of trails used by the rangers or forest patrol. Wherever possible the line should be carried within a reasonable distance of high places in the reserve, which may be made to serve as lookout points from which the smoke from

any fire may be quickly detected. The ranger thus provided with facilities for reporting the fire may not only make its presence known, but even in some cases cause a considerable force of men to approach it from the nearest point where they may be found, securing an immense advantage over the transmission of calls for assistance by messengers on foot or mounted on horseback. Although it is conceivable that each man might be equipped with a telephone box adapted to make connection with the line the practical conditions of forest patrol are such as to make it inadvisable for a ranger to be burdened with any unnecessary weight. This makes it desirable to provide call boxes at selected points along the line. It is far more easy for a man to walk a mile or two on the occasion when he does need to use the line than to be day after day weighted with a telephone box, ringer and batteries which will save only a few minutes of time.

If for no other reason than the use in connection with fire patrols, the telephone becomes a necessary adjunct to forestry, where there are large tracts of woodland. As the ease with which these forests may be reached by campers and sportsmen is increased, owing to improvements in transportation facilities, it seems to be a regrettable fact that the risk of fire is much increased. This risk will grow larger as time goes on, and it seems desirable to take the most thorough precautions to diminish the danger which is known to exist. The use of the telephone seems to be not only an effective method of promoting such protection, but it is economical and admirably suited to the practical conditions of forestry. It is for these reasons that private holdings no less than public reserves should have their fire lanes, patrol trails and lookout points; they should have call boxes along the trails, and the rangers or patrolmen should be given instructions in the use of the telephone to get direct commun-

ication with mills, logging camps or points where a number of men can be had at once. Also by the use of telephone call stations a considerable saving can be made in salaries of patrolmen, because one man with direct telephone communication can effectually cover a much larger area than

could be looked after by several men without its aid.

The establishment of a fairly complete network of telephone lines over both the forests subject to government control and those owned by individuals and firms is extremely likely to make losses from fire very low.

FOREST PRODUCTS

BY

R. S. KELLOGG

U. S. Forest Service.

THE annual yield of forest products in the United States reaches huge proportions, and it is only when we attempt to round out and properly estimate the various items that we get some comprehension of the important role the forests fill in the national economy.

A rough estimate of the quantity and value, in first hands, of the present yearly output of the forests runs as follows:

35 billion feet of lumber at \$15 per M	\$ 525,000,000
200 million cords of firewood at \$2 per cord	400,000,000
75 million hewed cross-ties at 40cts	30,000,000
Cooperage stock	25,000,000
Lath and shingles	25,000,000
Turpentine and rosin	25,000,000
3 million cords of pulpwood at \$5 per cord	15,000,000
1 million cords of tanbark at \$5 per cord	5,000,000
Mine timbers, posts, piles and other products	50,000,000
Total	\$1,100,000,000

These figures are upon investigations made by the Census and Forest Service, and there is a large chance for error in only one item, that, viz., of firewood. According to the estimates made by the Census in 1880,

when the population numbered fifty millions, the annual consumption of wood for fuel was then one hundred and forty-six million cords; hence, despite the largely increased use of coal, it is considered fair to assume that the eighty-five million inhabitants of the United States, to-day, are using at least two hundred million cords of firewood.

It will be noted that lumber makes nearly one-half the total of the forest products, though in actual content it is probably not much over one-fourth of the annual wood cut. This is because lumber is, comparatively, a highly finished product, and, in addition to being made from the best trees, it contains a considerable amount of labor cost.

Rapid as has been the increase in population, the increase in lumber consumption has been still more rapid. In round numbers the lumber cut in 1880 was 18 billion feet, in 1890, 27 billion feet, and in 1900, 35 billion feet. The increase in population from 1880 to 1900 was 52 per cent, but the increase in lumber cut was 94 per cent.

According to the data so far collected the lumber cut in 1905 was not in excess of that of 1900. The indications are that the maximum output of forest products has been reached for the country as a whole, and that

before long there will be a marked decline in *quantity* accompanied by a corresponding increase in *value*.

The Census figures on the lumber cut in 1904, excluding custom mills, are as follows:

Kind	M. ft. B. M.	Per cent.
Yellow pine....	12,812,307	37.5
White pine.....	5,253,846	15.4
Hemlock	3,268,787	9.6
Red fir.....	2,929,534	8.6
Oak	2,902,855	8.5
Spruce	1,303,886	3.8
Poplar	853,554	2.5
Cypress	749,592	2.2
Maple	587,558	1.7
All others.....	3,473,220	10.2
Total.....	34,135,139	100.0

There was, within memory, a time when white pine alone constituted one-half of the lumber cut of the United States. The ratio fell to about 22 per cent in 1900, and to 15 per cent in 1905. Michigan has become a small factor in white pine production; Wisconsin is waning, and it will not be long until Minneapolis and Cloquet cease turning out daily a million and a half feet each during the sawing season.

Yellow pine is now furnishing about 35 per cent of our lumber, and red fir, about 13 per cent. The output of red fir is increasing rapidly since it was credited with only 5 per cent of the total out in 1900 and 8.6 per cent in 1904.

The following statement of the value of the products of the lumber industry in the lake states, at the last four decennial periods, is taken from Census reports:

STATE	VALUE			
	1870	1880	1890	1900
Wisconsin...	\$15,131,000	\$17,952,000	\$60,966,000	\$57,635,000
Michigan...	31,946,000	52,450,000	83,122,000	54,291,000
Minnesota...	4,299,000	7,366,000	25,075,000	43,585,000

From these figures the deduction is easily made that, since 1870, the aver-

age yearly value of the products of the lumber industry in these states has been \$38,000,000, and that the years is over \$1,300,000,000.

As before mentioned, we have probably reached the maximum annual cut, and the constantly growing demand for lumber can have only one effect, viz., rapidly rising price, particularly with the species which are nearest exhausted.

With a present annual yield of 5 billion feet, white pine, despite the boasts of its southern and western competitors, is still a large factor in the lumber market.

The rise in lumber prices is making possible a rational, economical treatment of our remaining forests. Under the practice common in many places, little more than 25 per cent of the total wood content of the tree goes into lumber. Tops, lops, crooked logs, and high stumps are left to burn or decay in the woods, and slabs, edgings, and trimmings are fed into the burner at the mill until it becomes a cloud of smoke by day and a pillar of fire by night.

Every part of a tree is intrinsically capable of utilization, and the time is rapidly approaching when it will be utilized. Not many lumbermen have yet come to the point of logging their holdings according to methods which will insure a future crop of timber, but the progress in this direction is encouraging and rapid advancement is being made in the utilization of the log. Methods of manufacture are being lessened, slabs are cut thinner, odd lengths and widths are appearing, and new uses are being found for waste. It is the proud boast of the biggest mill in Minneapolis, and possibly the biggest in the United States, that it does not have a burner, and this example is worthy of imitation.

GREEN ASH (*Fraxinus Lanceolata*)*

XI.—Notes on Forest Trees Suitable for Planting in the United States

DISTRIBUTION AND MANNER OF OCCURRENCE.

The Green Ash is distributed over the greater part of the United States east of the Rocky Mountains, even extending into the mountains in Utah and New Mexico; to the northward it occurs as far as the Saskatchewan River in Canada. It is most abundant in the Mississippi basin, and is rather infrequent in the East. In the timber belts along the streams that drain the plains and prairie country of the middle West the Green Ash often occurs as the leading species, but in general, especially in the East, appears singly or in small groups among other hardwoods. The species most commonly found in such natural mixtures are the White Elm, Hackberry, Sycamore, Black Cherry, Red Ash, and Bur Oak.

CHARACTERISTICS OF FORM AND GROWTH.

The Green Ash is a medium-sized tree with a straight, undivided bole when forest grown, and slender spreading branches. A height of 80 feet and a diameter of 24 inches is rarely exceeded. Deep-seated fibrous roots, which extend laterally, form the characteristic root system. Because of the absence of vertical heart or tap roots, transplanting of seedlings is not difficult. The tree prefers full light, and is tolerant of moderate shade only.

In the arid or semi-arid regions the growth is not rapid. In the more humid sections the Green Ash compares favorably with other broad-leaved trees in rate of growth, although under no conditions is it a rapid grower. Under average conditions planted trees should make

posts in fifteen to twenty years, and be large enough for stakes or fuel in less time. From measurements made in Nebraska it appears that the diameter accretion in that region is from 0.2 to 0.3 inch annually.

THE WOOD: ITS ECONOMIC USES.

The wood of the Green Ash is hard, heavy, and strong, rather coarse-grained, and brittle. It is utilized in the manufacture of agricultural implements, carriages, and furniture, and, although said to be inferior in quality, is substituted for White Ash to a large extent; the timber of the two species is often sold indiscriminately. The relative fuel value of the wood is high. Although not first-class for fence posts, it is used for this purpose extensively in the north central states, and is highly prized in the many sections where more valuable species are not available.

SOIL AND SITE.

The Green Ash occurs naturally and is of best development on low, moist ground. It is said that the soils favorable to the best growth of the Green Ash are found on river bottoms and consist of slightly alkaline "gumbo." The tree is in general unusually tolerant of alkaline soils of any nature. Low swales at the foot of bluffs also produce good trees. The tree does not demand rich soil, but will thrive moderately well on a dry sandy loam, or on a stiff clay upland. Its ability to persist and even thrive under adverse conditions of temperature and moisture is unsurpassed by any broad-leaved tree. It is reported to be one of the best trees for planting at Brandon, Manitoba, in latitude 50 degrees north, and will do equally well

*Data furnished by the U. S. Forest Service.

on the dry plains and in the hot winds of New Mexico. On the arid plains of western Kansas and Nebraska it has survived on abandoned timber claims where nearly all other species have withered and died.

PROPAGATION.

Reproduction of the Green Ash is effected by seed and coppice growth. Propagation by seed is the best and only reliable method of artificial forest extension of the Green Ash. The seed may be purchased from dealers for 50 to 75 cents per pound, but wherever possible it is advisable for the local planter to gather his own supply. The several species of ash seeds are very similar in appearance, and the germination per cent low at best; hence it is advisable to send samples of purchased seed, or even home-gathered stock, to the Seed Laboratory of the United States Department of Agriculture, where all seeds will be identified and tested without charge.

Green Ash matures its fruit in early autumn. Collecting should be begun as soon as the seeds ripen. Stripping the seeds from the trees by hand is the most reliable method of collecting, since they do not fall early enough to sweep up from pavements and roadways. Fall planting may be practiced, but is in general inadvisable. The seeds may be kept over winter in a cool, dry place, or "stratified." If stored dry, the seed should be soaked in warm water for several hours before planting in the spring. If stratified, the winged seeds should be placed in boxes between alternating layers of slightly damp sand, and the boxes stored in a cool cellar. The vitality of the seeds can not well be preserved more than eight months.

Broadcast sowing of ash seeds on prepared or unprepared ground, or even planting the seed in hills where the trees are to stand, is generally an uncertain and unsatisfactory process, hence nursery culture is advised. The nursery and seed beds should be pre-

pared on rich, well-worked ground, an old garden spot being an excellent site if the soil is not too full of weed seeds. Preliminary working of the ground should be as for a garden crop. Planting may begin in spring as soon as danger of frost is over. For convenience in weeding, it is recommended that the seed be sown in drills, 8 to 12 inches apart for hand cultivation, and 2 to 3 feet apart if a horse cultivator is to be used. The normal germination per cent is rather low, hence the seeds should be dropped thickly enough to touch each other in the row. They should be covered about one-half inch deep and the soil pressed down firmly by means of a roller, or pressure with a board. In the arid regions it is sometimes best to cover such seed 2 or 3 inches in depth until after germination is well started, after which the dry surface layer of soil should be raked off, leaving a covering a little less than a half inch in depth. A mulch of chaff, sawdust, or old hay, if kept moist and raked off when the sprouts begin to break the ground, will answer the same purpose. Uniform moisture conditions should be maintained if possible, whether by surface irrigation, sprinkling, or mulching.

The seedlings should attain a height of 6 to 10 inches the first season, and should be transplanted to the permanent forest site when 1 year old. Shading of the young seedlings is not essential. If purchased from nursemens the cost is from \$2 to \$3 per thousand.

The Green Ash does not cast a heavy shade. It comes into leaf late in the spring and hence should not be planted alone, because in pure plantations the grasses are likely to thrive to the detriment of tree growth and prevent the formation of a desirable forest floor. Close planting (4 by 4 feet) in well-prepared soil is advisable on prairie soils, and wherever possible the ground should be cultivated between the trees until they spread out so as to form a complete ground cover. One

of the best trees for mixing with the Green Ash is the Hackberry. Other good species for such a mixture are Boxelder, White Elm, Scotch Pine, and Red Cedar. If grown in pure stands the Green Ash should be underplanted with Choke Cherry, Wild Black Currant, or Wild Plum. These shrubs will endure the shade and keep the ground free from grass and weeds.

ENEMIES.

Several insects are known to prey upon the Green Ash. In case injurious insects appear in alarming numbers upon natural or planted trees, specimens should be sent to the Division of Entomology, where they will be identified and measures suggested for their destruction or control. The chief climatic influence liable to injure the Green Ash is a protracted growing season, followed by a severe frost. Such injuries, however, are only temporary, and the tree soon recovers fully.

POSSIBILITIES AND USES.

The fairly rapid growth, easy propagation, and unsurpassed hardi-

ness of the Green Ash make it one of the most valuable trees for general planting in the arid, treeless West. It serves a useful purpose, whether planted for windbreaks, ornament, or timber. The wood is believed to be inferior to that of White Ash and many other species, hence its propagation in humid regions is not recommended, but in sections where wood of any kind is of high value because of its scarcity, extensive general planting is advisable. The Green Ash should be planted in place of Cottonwood in many sections.

PLANTATIONS.

Although the Green Ash has been extensively planted in the middle West, figures based on examinations and measurements of well-established plantations are not available. Forest plantations of Green Ash throughout Kansas, Nebraska, Iowa, and South Dakota are, in general, in a very thriving condition.

THE EIGHT HOUR LAW

THE rigid enforcement of the Eight-hour law upon Government construction work during the present summer by the President, has created much disturbance among those concerned.

On account of the enormous amount of work of an engineering character being carried on throughout the country the demand for labor has far exceeded the supply and the large contractors have so much private work that they are not willing to take up Government work unless the conditions are unusually favorable.

Practically all the laborers prefer to work 10 hours, as they cannot get the same pay for 8 hours. The contractors are not willing to put their men who have regularly worked a 10-

hour day upon Government work at 8 hours, as it demoralizes their forces and they cannot keep their well-trained men unless they pay one and one-quarter times as much for an 8-hour day on Government work as they do for 8 hours on private work. The contractors are therefore bidding at much higher rates on Government work than has heretofore been the rule. Therefore Government officers, especially those who are working on specific appropriations for a given piece of work, find themselves unable to prosecute it upon the plans which formed the basis of the appropriation by Congress. Likewise the contractors who have for many years been working for the Government on a ten-hour day and who are now doing work

on prices based upon the ten-hour day, are losing money, and in some cases are going into bankruptcy. Such works are consequently very much delayed and in some cases are at a standstill.

The newspapers reported only a few days ago that laborers on Government work on the Ohio River had gone on a strike, because they were cut down from 10 hours to 8 hours, presumably with a corresponding deduction in pay. In many cases the Government and contractors are compelled to give at least nine hours pay for eight hours work. Even then, on account of the great demand for labor, it is very difficult to get men, because they would rather work 10 hours in order to get the additional pay.

When labor is scarce the best laborers take only the better kinds of work and so we have the condition that on many works labor is more expensive, is harder to get, and is less efficient.

The result of the enforcement of the Eight-hour law must be a very large increase in the appropriations for work already authorized by the Government and in all future work.

It is certain that the work of the Government will hereafter cost from 10 to 20 per cent. more on all items of labor than in the past.

In the face of all this it is a fact that the laborers are more contented when working ten hours than when working eight, not only because they can earn more, but because on most construction work they are located at a distance from centers of population and there are no forms of occupation or amusement available during the non-working hours, except those of drinking, gambling, and the like, for which facilities are always supplied in the neighborhood of construction works by those who engage in business of that character. Although a large proportion of the workmen cannot resist the temptation offered by such resorts, yet many realize that the opportunity to save money is greatly diminished by an increase in the number of hours which are not devoted to labor.

This is practically true in all cases of out-door work, where the conditions are healthful as 10 hours work under such circumstances not an undue physical strain.

RECONNOISSANCE OF MARYLAND FORESTS

F. W. BESLEY, State Forester, is making a brief, general study of Maryland forest conditions—an investigation which will call him, in turn, to all the counties of the State. He has just made a preliminary examination of the Eastern Peninsula, especially of Wicomico County, in which he secured notes for the preparation of a forest map to be published in a report on forest conditions and possibilities. About 5 per cent. of Wicomico County is woodland.

Mr. Besley is immensely pleased with forest possibilities in that re-

gion. It is within the range of the loblolly pine, where abandoned fields grow up rapidly to this species and make, in a few years, an excellent stand. Such lands with a 10-year-old pine thicket upon them can be bought for about \$10 per acre, and in 30 years they will be worth, at present prices, from \$50 to \$70 per acre for the timber alone. For a pine stand 40 years old one man has been offered \$60 per acre for the timber alone. Timber of the same age and quality on a five-acre tract adjoining sold recently at the rate of \$71 per acre. The risk of

loss by fire is so slight as to be practically eliminated, and, as a rule, the large tracts pay the taxes from the sale of cordwood in thinnings or in clearing small areas. There is a market for almost everything down to 2 inches, so that clean cutting can be practiced profitably, followed by clearing and 8 or 10 years of cultivation. At the end of that period the fertility stored up by the forest will have become exhausted and the field may be abandoned to another crop of pine. The best stands of pine invariably come up in the abandoned fields. On some of these cut-over lands the pine will succeed itself naturally, while on others seeding, planting, or some preparation of the soil is necessary to insure renewal of the pine. Mr. Besley also made a hurried trip through the western part of the State. In Garrett County, he visited the tract, aggregating about 4,000 acres, which Mr. Garrett will present to the State for forest reserve purposes. A good opportunity is here offered for examples of forest management, for the region is frequented by tourists and sportsmen, and one tract of 400 acres is only 2 miles from Oakland, the county seat. Part of the forest has been burned over, other portions cut over recently, and other portions in heavy forest, so that different forms of management can be well shown.

There is in the western part of Garrett County one of the few virgin stands of hemlock. This tract contains about 75 acres, mostly hemlock, and will run about 25,000 board feet per acre. The associated species are white and red oak, of which there are some fine specimens. The greatest service forestry can do in the mountains of Maryland is to provide protection from fire. There are ample forest fire laws, and it is hoped that a good, healthy sentiment will be created for their enforcement.

The establishment of seed beds at the Maryland Agricultural College is contemplated, both for illustration of the best forest nursery practice in connection with the course of lectures before the students, and to obtain stock for planting on open places on the reserve.

Mr. Besley stopped at Rockville to inspect the grounds of the prospective plantation of Mr. Earle. Mr. Earle has about 5,000 white pine seedlings in nursery rows, which he intends transplanting to a permanent site next spring or the spring following. This experiment will be watched with interest to determine the adaptability of white pine for commercial planting outside the mountain counties of the State.





Government Irrigation Work During the Month

Begin Roosevelt Dam

"The first stone of the Roosevelt dam was laid by the contractor at 5 o'clock on the afternoon of September 20."

This message, from Engineer Hill, was read with a great deal of satisfaction by the officials of the Reclamation Service. It marks the beginning of the end of one of the most daring and difficult irrigation projects so far undertaken by the Government.

The contract for the construction of this dam was executed by the Secretary of the Interior April 21, 1905. Although the company which made this contract is energetic and experienced, the long succession of unusual floods which have occurred in Salt River in the past year has from time to time delayed the attempts to control the river with coffer dams and excavate the foundation. Time after time a large amount of work has been entirely destroyed and the contractors' appliances swept away.

It is, therefore, with a great sense of relief that the news is received that the erratic river has finally submitted to the curb and rein and a few weeks will see the contractors' works out of danger. The work will thereafter advance rapidly and benefits from the storage accomplished may be expected during the season of 1907, although the completion of the dam will require a much longer time. The dam will be 284 feet high, 280 feet long at the base and 700 feet long on top. It will back the water up for 25 miles, forming a lake with a capacity of 1,300,-

000 acre-feet, or water sufficient to cover that many acres one foot in depth. The cement mill erected by the Government has a capacity of 350 barrels a day and the saw mill thirty miles up the canyon has cut about 3,000,000 feet B. M. of lumber for use in the various structures. A power canal, 18 miles long, with a drop of 220 feet, is furnishing power to operate the cement mill and for use in constructing the dam.

When completed this project will reclaim more than 200,000 acres of desert land.

Work Moves Rapidly

The Secretary of the Interior has awarded the contract to the Pacific Portland Cement Company for supplying 27,000 barrels, more or less, of Portland cement for the Tieton and Sunnyside irrigation projects, Washington.

Four proposals were received for furnishing this cement, but taking into consideration the cost of transportation, that of the Pacific Portland Cement Company, Tolenas, California, was the lowest.

This marks the beginning of the construction work on the Yakima project, of which the Sunnyside and Tieton projects are independent units. The Yakima irrigation system, as planned by the Reclamation Service, will ultimately be one of the largest of the Government projects.

The nucleus of irrigation already established in this valley has shown that in fertility of soil and climatic condi-

tions this portion of Washington compares favorably with the best irrigated sections in the West.

The people have been very energetic in clearing away some of the preliminary difficulties encountered by the Government in starting the work, and the conditions are very favorable for a large increase in the irrigated area in the next few years.

Plans and specifications for the canyon portion of the main canal, Tieton project, were completed in July, and

The development of the distribution system of the first unit of Sunnyside project is now occupying the engineers, and plans and specifications are about completed for a concrete weir to replace the movable dam at the head of the Sunnyside canal.

Umatilla Work

The Board of Consulting Engineers recently convened at Portland, Oregon, to open bids for the construction of main canal and laterals of the



Salt River Canyon, Arizona, Looking Down Stream from Point
About Half Mile Above Dam Site.

bids for its construction will be opened November 15th. A field party is now engaged in the location of valley portions of the main canal. A wagon road is under construction up Tieton canyon to facilitate operations along that portion of the canal, and every effort will be made to complete the road and have everything in readiness for the actual commencement of canal construction next spring. A farm unit survey has been completed and plans for the distribution system are being studied and prepared.

distributing system, Umatilla irrigation project, Oregon, received seven proposals, which were transmitted to the Department for action.

The work is divided in two schedules, and the Secretary of the Interior to-day awarded contract for schedule 1, consisting of about 15 miles of main and lateral ditches, to Thomas Jaques, of Pilot Rock, Oregon. Mr. Jaques' bid was \$20,212.50.

All bids on schedule 2, which consists of 26 miles of main canal and laterals, were rejected on the ground

that they were unreasonably high. The Secretary of the Interior authorized the Reclamation Service to prosecute the work by force account. Horses for this work will be shipped from the Klamath irrigation project in the southern part of Oregon, as their use at the latter place is not needed during the winter.

Contract for Pumps

The Secretary of the Interior has executed a contract with the D'Olier Engineering Company, of Philadelphia, for furnishing and installing pumping machinery for the Buford-Trenton irrigation project, North Dakota.

The contract calls for the installation of three transformers of 300 kilowatt capacity, and eight motor-driven pumping units of capacities of 16 and 30 cubic feet per second under heads of 50 and 33 feet respectively, with necessary electrical apparatus and water pipes, in pumping stations near Buford, North Dakota. The D'Olier Engineering Company will receive \$40,836 for the work.

Now that the contract is let and the exact dimensions of the machinery are known, the engineers will determine on the design of the floating barge in which the intake pumps are to be mounted, and labor and material will be secured for the construction of the barge.

The water supply for this project is from the Missouri River, the slight gradient of which necessitates lifting the water direct from the stream by pumps. No long and expensive canal system will be required. An abundance of lignite fuel exists in the vicinity and it is proposed to generate power at the mines and transmit it electrically to the several pumping stations for the Buford-Trenton and Williston projects. The first pumps will be placed on floating barges. These will, of course, accommodate themselves to changes not only in water level, but to the shifting of the stream, the water being conducted from the

pumps on the barges through pipes with flexible joints, to the main canal. Additional sub-station lifts will be introduced wherever required.

Yellowstone Project

The Secretary of the Interior has executed a contract with the Pacific Coast Construction Company, of Portland, Oregon, for the construction and completion of the Yellowstone dam and accessory structures, Lower Yellowstone irrigation project, Montana and North Dakota.

This dam is to be a rock-filled, timber-cribbed structure, located about 18 miles northeast of Glendive, Montana, for the purpose of diverting the waters of Yellowstone into a canal extending about 80 miles down the west side of the river for the irrigation of 67,000 acres of land, two-thirds of which lie in Montana.

The work requires about 500,000 feet of lumber, 700 piles, 1,600 sheet piles, 11,000 cubic yards of rock filling and rip-rap, and 80 tons of steel.

The contracting company will receive \$142,825 for its work, which, according to the terms of the contract, must be completed February 1, 1909.

Belle Fourche Project

The engineers in charge of the Belle Fourche irrigation project, South Dakota, are rushing work all along the line, as freezing weather will soon force suspension of operations till spring.

The Chicago & Northwestern Railway Company has made surveys preliminary to connecting their main line with the Government town site.

There is great difficulty in procuring a sufficient force of laborers, and the contractors are put to great expense by being obliged to continually ship in men from Cuba, Denver, and other centers in order to keep the necessary number of men on hand to carry on the work. The contractors are paying from \$2.50 to \$2.75 per day for common labor, and the Government pays \$2.20 for eight hours work.

Authority has been granted for the construction of three miles of canal inside the Belle Fourche Reservoir to connect the Inlet canal by way of Dry

Gunnison Tunnel Work During the month of September 719 feet were added to the excavated portion of the Gunnison Tunnel, Uncompahgre irrigation project, Colorado, making a total of 16,031 feet. The progress during the last two months has not been quite up to the usual standard on this tunnel, on account of the extreme hardness of the quartzite rock in one heading and the friable and dangerous nature of the material in the other heading. The work has reached points so far from the portals that the difficulties in ventilation and tramming have increased.

Severe storms during the month delayed work on the South Canal and caused a loss to the contractor of approximately \$1,000.

The scarcity of labor throughout the West is being severely felt on this project in all lines of work, both contract and force account.

Creek, with the constructed portion of the South Canal, so that water can be delivered to lands under this canal next spring. The engineers believe the work will have reached a point where water can be delivered to about 10,000 acres next season.

Progress on North Platte

The Secretary of the Interior is asking for proposals for the construction of a diversion dam and headworks on the North Platte River in Nebraska, in connection with the North Platte irrigation project, Nebraska-Wyoming.

The work will involve the excavation of about 100,000 cubic yards of earth and rock, furnishing and placing in structures about 10,000 feet B. M. of lumber, and the construction of about 8,000 cubic yards of concrete masonry. The bids will be opened in Mitchell, Nebraska, November first.

Work on the North Platte project has progressed rapidly during the sea-

son. The first forty-five miles of the Interstate canal has been furnishing water at several places for irrigation, but preparations for receiving it were incomplete and full use of the canal will not be made until next season. The second section of the canal is under construction and surveys for the third fifty miles are being made. Contracts have been awarded on fourteen schedules of the distributing system and the work on the laterals is already in progress. The Pathfinder dam is progressing favorably and it is expected that about 15,000 cubic yards of masonry will be laid before cold weather forces suspension of work.

It is hoped that water can be delivered to about 40,000 acres under this project during 1907.

Contracts Let

The Secretary of the Interior has executed a contract with the General Electric Company, of Schenectady, New York, for furnishing material and machinery for the electric generating plant of the power and pumping system, Williston irrigation project, North Dakota. This work will cost the Government \$41,242.

The operation of the pumping machinery in North Dakota will be watched with great interest by the people in many sections of the West where the Reclamation Service has located large areas above the line of gravity supply. The power for the Williston and Buford-Trenton projects will be generated at the lignite mines in the vicinity of Williston, and transmitted electrically to the several pumping stations of the two projects.

The Secretary of the Interior also executed a contract with John H. Donohue, of St. Paul, Minnesota, providing for the construction and completion of building for Station 1, power and pumping system, Williston irrigation project, North Dakota. The estimated cost of the work will be \$13,886.

A contract has been awarded to the Kansas Portland Cement Company,

of Iola, Kansas, for furnishing 5,000 barrels of Portland cement for the Garden City irrigation project, in western Kansas.

The bid of the above named company, at \$1.60 per barrel, f.o.b., cars at Iola, was the lowest received, transportation considered.

Another contract is that with Marcus E. Getter, of Mitchell, Nebraska, for the construction of ten miles of earthwork, distributing system, Interstate canal, North Platte irrigation project, Nebraska. Mr. Getter's bid was \$5,649.

The bid of Flower & Twing, of Morrill, Nebraska, for the work provided for in Schedule 4, earthwork of distributing systems, North Platte irrigation project, Nebraska, has been accepted. The bid for this work was \$11,711, and the contract calls for the earthwork on about ten miles of lateral.

Bids Rejected

The Secretary of the Interior has rejected all bids received for the construction of structures for the Garden City irrigation project, Kansas,



Canyon Above Reservoir Site, Salt River, Arizona, Looking Down-stream

Henry C. DeLaney, of Williston, North Dakota, has secured the contract for the construction and completion of canals and structures under the Williston irrigation project, North Dakota. The work involves the excavation of about 220,000 cubic yards of earth, and furnishing labor and material for various structures requiring about 40,000 feet B. M. of lumber, and 1,000 cubic yards of concrete. Mr. DeLaney's bid was \$81,867.

and authorized the construction of the work by force account under the direction of the Reclamation Service.

The work consists of the construction of deep and shallow wells, suction pipes, pumping stations, siphons, concrete-lined conduits, and fencing.

The bids were all greatly in excess of the estimates of the engineers, except one bid for a gate valve, and it is believed that the work can be more

economically performed by force account.

The Secretary of the Interior has rejected the bid of Henry C. DeLaney, of Williston, North Dakota, in the sum of \$166,289 for the construction of canals, ditches and structures under the Buford-Trenton irrigation project, North Dakota.

The work involves the excavation of about 410,000 cubic yards of earth,

and furnishing labor and material for a pumping station and various structures requiring about 140,000 feet B. M. lumber, about 2,000 cubic yards of concrete, and about 25,000 pounds of structural steel.

Mr. DeLaney's bid was the only one received, and was rejected as unreasonably high.



The Month in Government Forest Work

Personal Notes

Mr. Gifford Pinchot, Forester, returned on Thursday, October 11, from an extended western tour. While away, he attended the Irrigation Congress at Boise City, Idaho.

At this Congress, Hon. Weldon Brinton Heyburn, junior Senator from Idaho, took strong ground against the policy of forest reserves, asserting, among other things, that forests exert no influence upon stream flow.

Mr. Pinchot's advocacy of the policy in question was, however, supported by numerous other speakers.

Leaving Boise City, Mr. Pinchot visited the Big Horn and Yellowstone reserves, returning thence to Washington some weeks earlier than had been expected.

Mr. Herbert A. Smith, Editor, recently spoke before the Kentucky State Development Association, at Winchester. His subject was, "Forest Resources of Kentucky."

As this publication goes to press, Mr. George W. Woodruff, of the Di-

vision of Law, leaves for Lexington, Kentucky, to address, on Oct. 23d, the meeting of the State Bureau of Labor, Agriculture, and Statistics. He is also to speak at the annual meeting of the American Civic Association, at Milwaukee, Wis., on Oct. 26th, on the Appalachian reserve.

Mr. J. M. McVean, of the Division of Law, has for some weeks been engaged in a tour of inspection of some of the western forest reserves.

Forest Extension Work

Mr. E. A. Sterling, Chief of the Division of Forest Extension, returned to Washington, Oct. 12th, from an extended inspection trip through the West. In the course of this trip Mr. Sterling visited the planting stations in the San Gabriel, Santa Barbara, Salt Lake, Pikes Peak, and Dismal River reserves, and attended supervisors' meetings at Boise and Portland; in connection with city watershed and rangers' nursery work, he also visited other reserves in Idaho, Wyoming, Montana and Arizona. He started a nursery establishment in

the Pocatello reserve as a part of the city water shed project for the city of Pocatello. Another good city water shed proposition, benefiting Logan, Ogden, and Provo, he also located in the Uintah reserve. He reports that planting is needed for the benefit of the Santa Fe and Los Vegas water sheds and for the Jemez and Pecos River regions.

Rangers' nurseries are proving very popular. Supervisors and Rangers are, in most cases, anxious for them, and representatives of the Forest Extension work have been helping start one or two in each reserve to serve as models.

Conditions at Halsey, Neb., Mr. Sterling reports to be good. Last spring's plantation is looking well, and about 4,000,000 seedlings are in the nursery.

Examination of Lands

Prof. George L. Clothier, representing the Division of Law, has been investigating claims for land alleged to be agricultural, in the Bitter Root Forest reserve in Montana. He has spent about six weeks in that vicinity. He finds that the Bitter Root Valley is one of the best fruit countries of the west, apples in particular attaining a high degree of perfection in that region. Under irrigation, a good apple orchard will probably bring a fair rate of interest on an investment of \$500 per acre.

Prof. Clothier reports the existence of large areas of land available for fruit raising, provided only adequate water supply were in sight. Still larger areas, however, are probably permanently incapable of irrigation.

On the Bitter Root Mountains is found some of the finest yellow pine of the Northwest, worth, on the stump, from \$60 to \$100 per acre. Wherever titles to timber land can be obtained the lands are rapidly snapped up by speculators.

A few days ago Prof. Clothier returned to Washington and made his

report to the Forester. From here he goes to the Mississippi Agricultural College to resume the teaching of forestry.

Examining Mineral Lands

On August 20th Judge A. C. Shaw, of the Division of Law, left Washington for the Plumas Forest reserve, at Quincy, Cal. There he was joined by Mr. E. C. Finney, Law Examiner of the General Land Office, and L. G. Gillette, J. A. Dorsey, and W. L. Walker, trained geologists from the Geological Survey.

With the assistance of the Forest Supervisor, L. A. Barrett, this party established a camp in the reserve at Shoo-fly; and under the direction of both departments, Agriculture and Interior, instituted an investigation on the ground to determine the mineral or non-mineral character of certain alleged mineral land locations in that reserve. The evidence gathered will be made the basis of a hearing before the Land Office, at which the validity and legality of these mining locations will be tested.

From Shoo-fly, the party went, about Sept. 24th, to Santa Barbara, Cal. The camp was moved from place to place. Leaving the geologists on the ground to complete their investigations, Mr. Finney returned to Washington, while Judge Shaw went to the Santa Barbara reserve to investigate a condition alleged to be similar to the one above described. From Santa Barbara he went next to the Wichita reserve in Oklahoma, returning from there to Washington, Oct. 7th.

Reserve Administration

Mr. Findley Burns, of the Division of Publication and Education, who devoted a number of weeks in the past summer to visiting reserves, returned with a very encouraging report. The loyalty of rangers, assistant rangers and guards to the Forest Service he regards as especially noteworthy. Working at salaries very moderate, and often much below what they have

received elsewhere, they manifest an *esprit de corps* and a devotion to their tasks worthy of the veterans of Valley Forge or of the soldiers who followed the flag of the Man of Destiny. A partial explanation for this mental attitude is found in the degree of authority and the opportunity for practical administrative work enjoyed by these men. Rangers and assistant rangers are frequently men who have received training either in the Forest Service or in forest schools. Guards, however, are usually local men who have entered the service temporarily and, later, taken the Civil Service examination and become enrolled as permanent employees.

In some respects, the positions on the reserves are disappointing to the men, as many of them had expected situations similar to those of the Canadian mounted police. Instead, the work is hard and trying in the extreme. One ranger, for example, finds himself in a region too rough to permit the use of a horse; yet he must care for the interests of the reserve, not only by visiting its remote limits, but by scaling every log sawed at the mill. Schools are non-existent in this region; for this and other reasons this man finds it impracticable to bring his family to the reserve. He has earned as high as \$115 per month in the Secret Service, and probably from \$5 to \$8 per day and expenses as a guide; yet he serves the Forest Service for \$75 per month.

The reserve force workers are rapidly attaining a high degree of efficiency. Reserve inspectors, many of whom have had experience in the office of the Forest Service, are training and disciplining the force and bringing it into effective shape.

Happily, the fire fiend, the most lawless and deadly foe of the forest, is being in a wonderful degree brought under control by the reserve administrators. Prevention is the end most earnestly sought; with what success may be inferred from Mr. Burn's statement that, on the vast majority of reserves, the damage from fire has now been reduced to virtually nothing. The piling of brush by cutters of timber is insisted upon; in practically all cases the brush thus piled is burned by the reserve people, and under supervision so careful that the risk of damage is reduced practically to zero.

During recent months **Sylvicultural Studies** Mr. Albert Gaskill, of the Division of Publication and Education, has visited a number of western reserves, in order to locate permanent sample plots on which, through the course of years, the sylvical characteristics of important trees may be accurately studied and recorded. In this way it is hoped that the knowledge of the sylviculture of these trees, which is at present defective or based upon foreign sources, may be supplemented by the knowledge of American conditions thus recorded.

Goes to Yale Mr. R. C. Bryant, for some time in charge of the co-operative work of the office of Forest Extension, has recently resigned to assist in organizing the work in connection with the chair of practical forestry and lumbering, at the Yale Forest School. This chair, it will be remembered, was established by subscriptions from leading lumbermen throughout the country.



FORESTER AND DIRECTOR OF CENSUS WILL COOPERATE IN COLLEC- TION OF ANNUAL STATISTICS OF FOREST PRODUCTS.

LAST year the Forest Service undertook to gather statistics of forest products, with the purpose of publishing, annually, data to show as closely as possible the drain upon the forests. In this work it had the co-operation of the National Lumber Manufacturers' Association and, as regards timber used in mines, also that of the U. S. Geological Survey. In this manner statistics were gathered on lumber, shingles, lath, pulpwood, slack and tight cooperage stock, veneer, tanbark, railroad ties, wood used in mines, and wood used for distillation. Recently an agreement has been made between the Chief of the Forest Service and the Director of the Census, Department of Commerce and Labor, by which these two bureaus will together collect and handle the data in the manner described below.

The Bureau of the Census takes a census of the manufactures of the United States every fifth year, and of agriculture every tenth year. Statistics of forest products are included in these censuses so far as represented by the products of timber camps, sawmills and pulp mills. Information upon the consumption of these and other forest products is essential to the work of the Forest Service and it has organized a system of collecting the data annually. Every fifth year, the work of the two bureaus will be a duplication, causing unnecessary expense to the Government and annoyance to the manufacturer who will receive two requests for the same information. The Bureau of the Census, through its general knowledge of statistics and its excellent equipment for tabulating reports and computing re-

sults, is better fitted than the Forest Service to handle this part of the work. The Forest Service, through its technical knowledge of wood-producing and wood-using industries, is in a position to advise concerning the kind of information to be obtained, the interpretation of reports, and the form of presentation of results. Therefore, the Director of the Census and the Chief of the Forest Service mutually agree as follows:

1. In conformity with the letter of the Secretary of Agriculture of August 31, and the reply of the Secretary of Commerce and Labor, dated September 25, the Bureau of the Census and the Forest Service will co-operate in the collection of annual statistics of forest products, beginning with the year 1906.

2. The collection of the annual statistics will be done chiefly by correspondence, and as far as possible in co-operation with associations of lumber manufacturers. The letters transmitting the schedules shall be over the joint signature of the Director of the Census and the Forester and shall explain the joint arrangement under which the work is carried on. Subsequent routine correspondence in connection with the work will be over the signature of the Chief Statistician for Manufactures of the Census Bureau. The Forest Service shall also have the right to carry on correspondence in cases where such action will increase the efficiency of the work. All data will be tabulated by the Bureau of the Census. In cases where satisfactory returns cannot be secured by correspondence, or when other reasons it may be necessary to engage in field work, such work shall be done

by representatives of the Forest Service at the expense of the Service.

3. The schedules used in the collection of data shall be in the joint name of the Bureau of the Census and the Forest Service. For the years covered by the quinquennial census of manufactures, the regular census schedule shall carry the inquiries covered by the schedule for the statistics of forest products, the work being made part of the regular census of manufactures; the results, however, to be tabulated separately as soon as obtained and placed at the disposal of the Forest Service.

4. Immediately upon completing the statistics for each year, the results shall be printed in bulletins by the Bureau of the Census in which the joint arrangement between the two bureaus shall be referred to and proper credit given to the Forest Service. The reports from the manufacturers shall be available for the information of the Forest Service as soon as obtained.

5. The Forest Service shall turn over to the Bureau of the Census copies of all lists of names and addresses of producers and consumers of forest products that have been compiled in connection with this work. The For-

est Service shall have the right to keep in its possession such lists of names corrected by the Census lists to be used for the mailing of its publications and other matters connected with its regular work.

6. A member of the Forest Service designated by the Forester will be appointed Expert Special Agent of the Bureau of the Census. The Expert Special Agent will determine the kind and amount of data to be collected, and the time of sending out the schedules. He will give technical advice whenever necessary for the interpretation of reports and will prepare the text of resulting publications. The Chief Statistician for Manufactures of the Bureau of the Census will decide all questions of tabulation and computation which do not involve a technical knowledge of the industry concerned. In case of disagreement between the Expert Special Agent and the Chief Statistician of Manufactures, the matter shall be referred to the Director of the Census and the Forester. The salaries and expenses of the Expert Special Agent and any other technical foresters who may be assigned to the work will be paid by the Forest Service. All other expenses will be borne by the Bureau of the Census.

CAUSES UNDERLYING THE LIMITED PRODUCTION OF CREOSOTE IN THE UNITED STATES

IN 1903 the United States produced 62,964,400 gallons of coal tar, with a gross value of \$2,199,970—or a value per gallon of \$0.0349. In 1904 the production was increased to 69,498,685 gallons. The gross value, however, declined to 2,114,421 dollars, making the value per gallon only \$0.0304. Of this coal tar produced in 1904, 41,726,970 gallons came from gas works, and 27,771,115 gallons, from coke ovens. About one-half of the gasworks product is distilled, the

other half being used as paving materials and for other local purposes. Practically all the coal tar from the "by-product" coke ovens is distilled; from the "bee-hive" coke ovens, however, little or no coal tar is collected. The creosote distilled from all sources in the United States in 1903 amounted to about 4,000,000 gallons. In the same year 3,711,565 gallons were imported from Germany and England. In 1904 the domestic product had risen to 4,863,400 gallons, while the amount

of imported oil had risen only to 3-783,472 gallons.

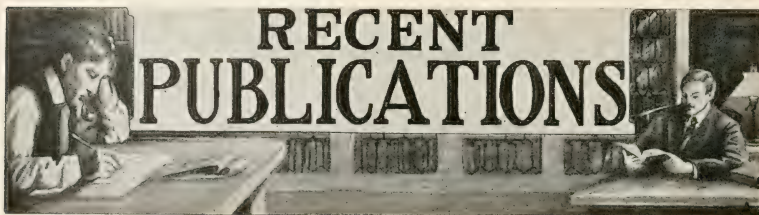
Statistics for 1905 and for the present year are not available, but it is certain that, although the production has considerably increased, it has altogether failed to keep pace with the demand, which, on account of the great activity now existing in wood preservation in this country, has made enormous advances. The restriction of the American production of creosote in the past has been largely due to the economic conditions which have resulted in an extensive rather than an intensive operation of all industries. No restriction had been placed on the private exploitation of natural resources far beyond the present needs; and with the development of effective machinery the inevitable result has been a rapacious, non-intensive exploitation accompanied by prodigious waste. Just as greater profits have been secured from cutting all merchantable timber in one operation and then investing the proceeds in new stumpage rather than in the practice of conservative forestry, so, unless the creosote were sold at a price which, in consideration of the cheapness of untreated timber, the consumer could not afford to pay, greater returns have been obtained by making investments in new coke ovens rather than in plants for the collection and distillation of the tar. The universal tendency of private enterprise always to seek personal and immediate profit rather than the ultimate national good, or even greater ultimate personal profit at the sacrifice of present gain, has received in the last half century a worldwide emphasis by the unprecedented commercial activity of the period, which, in the United States, has been particularly strong. To treat a railroad tie with 12 pounds of creosote per cubic foot costs about 45 cents, if the creosote can be obtained for about 8 cents per gallon. Even although railroad managers themselves may be convinced of the ultimate economy afforded by the preservative treatment of the ties, the stock-

holders will, under present conditions, rarely permit so large an increase in the current expenses of maintenance. Notable advances, however, are being made. In 1905 approximately ten per cent. of the ties laid throughout the United States has received preservative treatment. The larger portion were treated with zinc chlorid at a cost of about 16 cents per tie; whereas, if creosote had been used, a reduction in the annual cost of the treated ties could doubtless have been secured in most situations. The conservative distrust of all innovations was also, in this case, strengthened by the fraudulent treatments given during the introductory stages of the industry, either by insufficient penetration, by methods injurious to the timber, or by the use of cheap and ineffective adulterants. The large demand in the United States for soft pitch for roofing has also tended to retard a movement towards the oils of better and heavier grades. On the other hand, there is no considerable market in America for hard pitch, whereas the large demand in Europe permits the distillation of the heavier oils.

The cheapness of lumber, and the ease with which it could be obtained in any quantity, have also tended to delay the introduction of conservative methods. With apparently inexhaustible forests, and a mechanical perfection in their exploitation which has been unequalled elsewhere in the world, lumber has hitherto been too plentiful and cheap to necessitate its artificial preservation. The same causes which have brought about an enormous consumption of wood in America have also tended to discourage wood preservation as being unnecessary and impracticable. This tendency has been emphasized by the high cost of American labor as compared with that of Europe. These conditions, however, are rapidly changing. The lumber prices in the United States have advanced in the last ten years from 50 to 100 per cent., and the rate of increase shows no present signs of slackening. The sup-

posedly inexhaustible supply has dwindled to so small and definite a quantity that the large timber-using industries especially are becoming concerned for the future. Economic conditions also are rapidly becoming more stable, and for almost the first time the industrial world is now able to consider the future. There is, in consequence, a marked increase in

wood preservation, and this is particularly true of creosoting. But notwithstanding these facts, the production of creosote has so far failed to keep pace with the growing demand that contracts have already been given for the domestic production of the next two years; and it is certain that the amount now imported considerably exceeds that produced in the United States.



Utilization of Tupelo. Circular No. 40, U. S. Forest Service. By H. B. Holroyd; 16 pp.; illustrated. Government Printing Office, 1906.

It is only recently that the long, deep-rooted prejudice against tupelo has been proven unfounded, and, its value when handled in the manner suitable to its peculiar character, demonstrated beyond a doubt. The unfavorable attitude of lumber users to the wood has been largely caused by improper methods of handling. The bulletin mentioned here contains much additional information as to the best methods of preparing it for market, particularly as regards seasoning, in which, heretofore, the greatest difficulties were encountered.

Journal of the New York Botanical Garden. August, 1906; 20 pp.; illustrated. Lancaster, Pa., 1906.

The August *Journal* contains an interesting account of Prof. William R. Maxon's botanical collecting trip in Costa Rica, and an account of work done at the tropical station of the Garden, at Jamaica, together with notes and comment of interest to botanists and students.

Indian Forester. July, 1906. Vol. XXXII, No. 7. 391 pp.; illustrated. Pioneer Press, Allahabad, India.

Much insight into Indian forest methods is to be gleaned from the July issue of this valuable periodical. To American foresters the article on "Working Plans for Cantonment Forests" is interesting, and the descriptions of "rest-houses," built for the

accommodation of forest officials in their tours of inspection, also contains much of interest to American forest officers.

Sub Surface Drainage of Land by Tile. Reprint from "Michigan Engineer." By Robert E. Horton.

Mr. Horton's exposition of this subject is presented with a large amount of valuable data, together with suggestions of a practical nature, and, in addition, the technical features of land drainage, forming in all a very interesting pamphlet.

Journal of the Western Society of Engineers. Vol. XI, No. 4; August, 1906. Chicago.

The August *Journal* contains a number of articles of more than usual interest, chief among which is Mr. M. O. Leighton's paper on High Pressure Sluicing Gates. Mr. Leighton is a prominent engineer in the Reclamation Service, in charge of the hydro-economic investigations of the Service, and the material presented in his paper is the result of considerable study and experience, with interesting data regarding some of the plans approved for the recent irrigation projects of the government. Mr. L. E. Ashbaugh contributes an interesting paper on "The Assessment of Drainage Districts."

The *Journal* includes the papers read at meetings of the Society, together with such discussion as they may have evoked at the time of presentation. In the case of Mr. Ashbaugh's article, the discussion includes some interesting experiences of members in the same line.

Forestry and Irrigation

H. M. SUTER, Editor

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The Drive—A log jam overtaken by a late freeze

FORESTRY AND IRRIGATION

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NO. 11

NEWS AND NOTES

Annual Meeting

The annual meeting of the American Forestry Association will be held in Washington on Wednesday, January 9, 1907.

In accordance with the by-laws, the object of this meeting is to elect officers and transact such business as requires to come before the entire association.

The coming meeting should be of wide interest to members of the association and to all friends of the forests.

The topic to which chief attention will be given will be the White Mountain and Southern Appalachian Reserves, their significance, the importance of passing the bill establishing them, and the methods to be employed to secure such legislation.

A large attendance is greatly desired.

Full details as to hour, place of meeting, and program will be published in the December number of FORESTRY AND IRRIGATION.

National Drainage Congress

The Commissioners of the District of Columbia have designated F. H. Newell, A. P. Davis, and C. J. Blanchard of the U. S. Reclamation Service,

and H. M. Wilson, of the U. S. Geological Survey, to represent the District at the National Drainage Congress to be held at Oklahoma City, Okla., on December 5, 6, and 7.

The problems of reclamation now being solved by the Government through the agency of the Reclamation Service are very similar to those of drainage, and, in fact, the question of drainage enters into reclamation equally with that of irrigation. The successful results already attained by the service under the terms of the act of June 17, 1902, by which over \$40,000,000 are being invested in the West show what can be done by the National Government under a comprehensive law.

The objects of the National Drainage Congress is to start a campaign of education that will arouse the people to the importance of a general movement for the reclamation of lands by drainage.

Government Accounting

Mr. N. E. Webster, Jr., accountant for the U. S. Reclamation Service, recently attended the annual convention of the American Association of Public Accountants, at Columbus, Ohio.

Mr. Webster is a certified public accountant of the State of Michigan, and a Fellow of the Michigan Association of Certified Public Accountants, and at the recent convention he was elected a member of the American Association.

Much interest was manifested at the convention in the subject of co-operation with the general Government in its efforts to improve accounting methods. A committee was appointed to prepare an advisory report to the Keep Commission on the subject, and Mr. Webster, who is chairman of the assistant committee on cost keeping and a member of the committee on accounting, was consulted as to the interest of the Government service in modern ideas of bookkeeping and auditing.

In its desire to adopt such progressive ideas the Reclamation Service has been among the foremost of the various bureaus of the Government service. The idea has been that as this was not only a work of great magnitude, but one wherein the Government was virtually acting as trustee for the people of the Western States, its accounting system should be of a character comparable with that of its engineering, and no pains have been spared to accomplish this result. For this purpose a committee consisting of the chief accountant, a disbursing officer, and a representative of the Price Waterhouse & Co. public accountants of New York, recently visited the Uncompahgre, Truckee-Carson, Salt River, and Yuma irrigation project, and have made a report looking to a uniform system for the bookkeeping at all field offices.

Fire Warden Service

The American Lumberman prints a recent expression by Gen. C. C. Andrews, Chief Fire Warden of Minnesota calling attention to the efficacy of the fire warden service of the State. Reviewing the work of the service this year General Andrews says:

"The past summer was the dryest

that has been experienced since the year of the Hinckley fire, but we have escaped with little damage from forest fires. I doubt if the damage will exceed \$10,000 in this State. The most important fire, and it was hardly a forest fire, occurred near Albion when some ties and poles were burned. It was started by a man knocking the embers from his pipe.

"While the danger was very imminent at times in various places in northern Minnesota, the fires did very little damage. The wardens were very alert and active. It is impossible to tell how much or how little they may have accomplished, but the fact remains that they were alert and little damage was the result.

Minnesota has many square miles of valuable timber, probably the most valuable timber in the United States. Those who own this property naturally safeguard it to the extent of their ability, their efforts along this line being supplemented by the fire warden service established by the State. Of course it would be possible for the timber of Minnesota or of any other state to pass through great danger with little or no damage, but coincidents of this kind do not occur frequently.

"Every hunter, trapper and camper who enters a forest, every settler upon its borders, constitutes an element of danger. Some of these people are uninformed; many of them are careless or reckless. It is incumbent then upon the State to provide some adequate system of protection for this kind of property, which cannot be replaced within the life of the present generation, and this duty is an imperative as the obligation of a city to provide facilities for fighting urban fires."

Coopers and Forestry

At the meeting of the International Slack Co-operae Manufacturers' Association, held at Memphis, Tenn., October 2 and 3, the organization decided upon the appointment of a permanent Forest Committee to cooperate with the Forest Service. The

association is evidently greatly interested in the work of the Forest Service in collecting statistics relative to the lumber industry, and particularly regarding the coöperage trade. The committee is appointed with the specific idea of coöperating in every way possible with the Forest Service in its effort to compute statistics on the supply and demand of forest products—particularly as regards the coöperage industry. Mr. W. R. Anderson read a paper on the collection of coöperage statistics by Mr. Hale, of the Statistics Committee, in which the lack of interest and coöperation of the trade in the work of the Forest Service was deplored. Mr. Hale's paper explained in detail the importance of accurate figures on the production of manufacturers and asked for hearty coöperation by manufacturers.

Colorado Forest Policy

The Colorado State Forestry Association will present to the Sixteenth General Assembly of the State a memorial praying for the enactment of a general measure looking to the adoption of a definite forest policy for Colorado. The memorial cites the vital importance of forest conservation in the State, and advocates the appointment of a State forester. Provision is requested for the institution of a district department of forestry at the State Agricultural College, and the establishment of a state forest nursery, from which farmers and landowners of the State may secure, free of charge, trees for forest planting. The petition also prays for the establishment of an experimental plantation, where tests may be made of trees to determine their economic value and climatic adaptability, for the permanent educational benefit of tree planters. The petitioners also pray * * * "that it be made a law that no lands nor plantations within the State containing trees planted by farmers or landowners, for use or profit, shall be assessed for taxation at a higher value by reason of the trees thereon than other lands adjacent thereto which are

used for purely agricultural purposes." Protest is made against the practice of cutting Christmas trees, and recommendation made that such be made an offense.

It is to be hoped that the Legislature of Colorado will act upon the petition and enact a general measure such as is desired.

Vermont Forests

On behalf of the State Forestry Commission of Vermont, Ernest Hitchcock, commissioner, has submitted to the governor a report showing that 4,000,000 acres of land in the State are of a character suitable only for timber growth. At present this acreage is nonproductive, but Mr. Hitchcock claims that if handled properly a revenue of \$1 to \$2 an acre could be realized annually. Coöperation with the Forest Service is recommended.

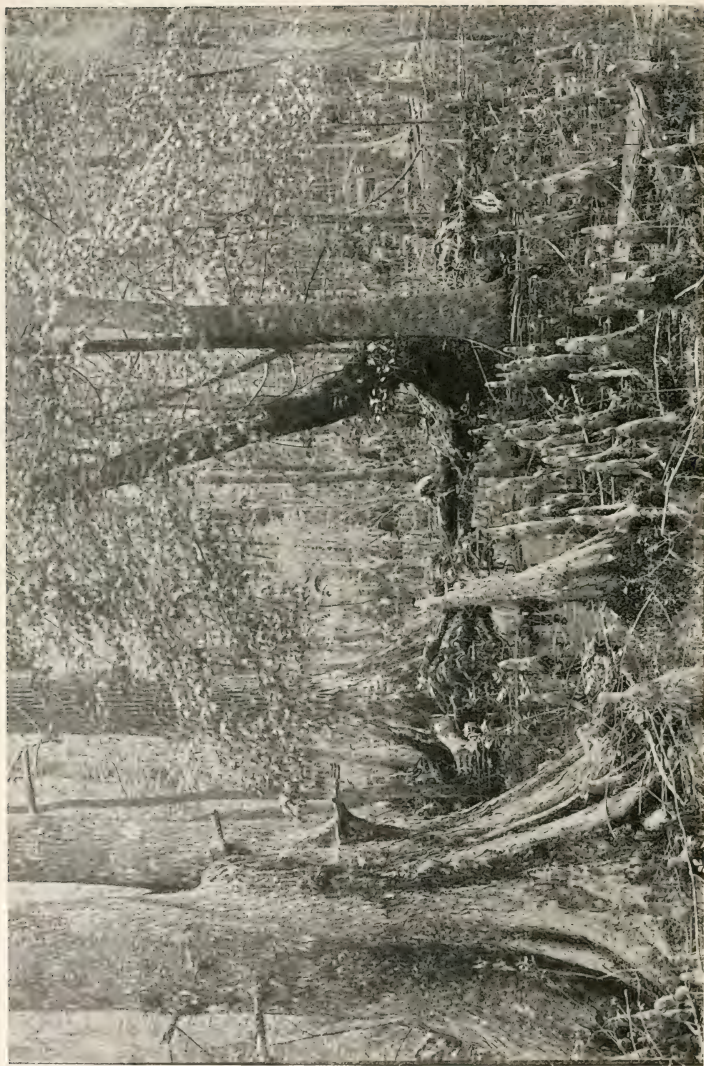
Of Interest to Women

On November 13, Misses E. G. Cummings, of 16 Kennard Road, Brookline, Mass., and Harriet E. Freeman, of 37 Union Park, Boston, Mass., called at the offices of the Forest Service and the American Forestry Association, in the interest of the White Mountain and Southern Appalachian bill. It is hoped, among other things, they may be able to enlist the women's clubs in this important measure.

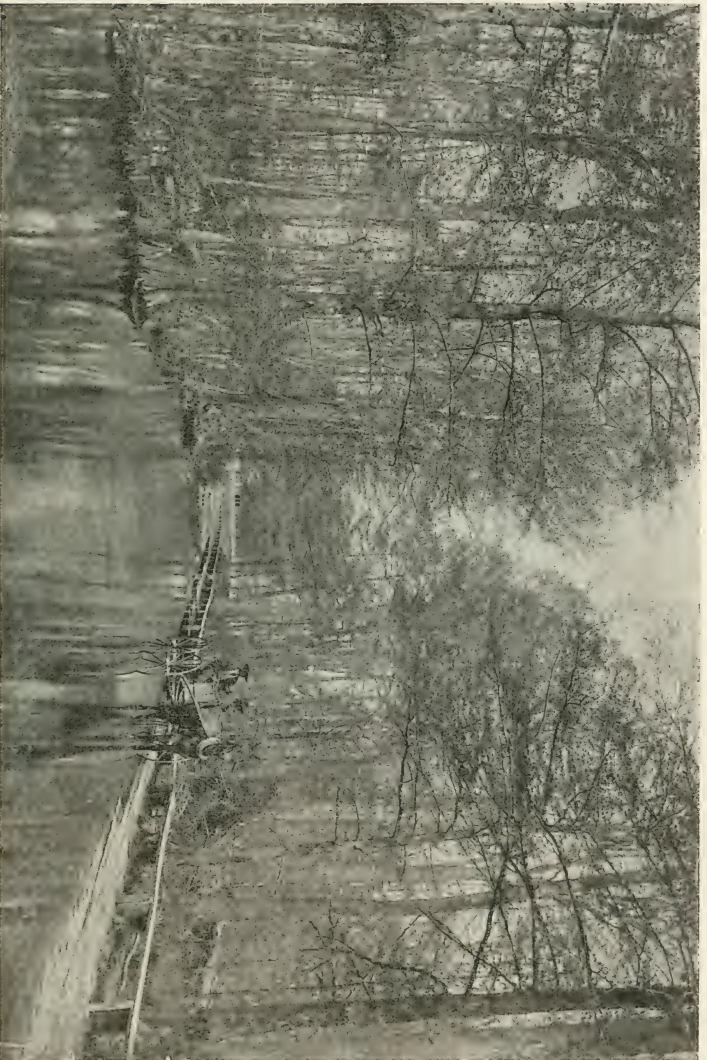
Important Conference

An important conference of members of the Reclamation Service will be held in Oklahoma City, Okla., December 5th, 6th, and 7th. Chief Engineer F. H. Newell, Assistant Chief Engineer A. P. Davis, and C. J. Blanchard, statistician, will probably be present from Washington, and will meet a number of supervising and project engineers from the Southwest.

As the conference occurs during the first annual session of the National Drainage Congress, the subject of national drainage will undoubtedly receive careful attention. In the four years which have elapsed since it was



The Problem of Reclamation by Drainage. Southern margin of the Dismal swamp, showing character, swamp landscape and forest.



A channel in the Swamp Country. The general aspect of the wide shallow currents of water that connect the various swamp-areas along the South-Atlantic coast-line. There are nearly 100,000,000 acres of swamp-lands in the United States.

formed, the Reclamation Service has demonstrated in a thoroughly practical way that the Government can reclaim successfully broad acres of desert and create therein prosperous and happy agricultural communities.

It is but natural, therefore, that the advocates of national drainage works for the vast swamp land areas of the United States should look to the Reclamation Service to take charge of the work. Irrigation and drainage go hand in hand. Most of the large irrigation projects now under construction by the Government provide for elaborate drainage systems, so that the problem of draining the swamps of the country can be solved without difficulty whenever Congress in its wisdom shall authorize the beginning of the work.

Much of the preliminary work in the several States has been done already. Detailed surveys of vast areas of submerged lands have been made and maps and other data are on file in the office of the U. S. Geological Survey. The engineers and topographers who have been preparing these maps of partly submerged areas, and who have been measuring the water which flows into or away from them, are entering heartily into the plans for reclamation and are greatly pleased at the awakening of public interest in the matter. The National Drainage Congress will find in the well organized body of men in the Geological Survey and the Reclamation Service willing assistants to any general plans that may be proposed.

Miners Ask Protection

According to the San Francisco *Chronicle* President Roosevelt will be asked to protect the miners of Del Norte County, Cal., against land grabbers. A petition has been framed and signed and sent to State Mineralogist Aubury to be forwarded to Gifford Pinchot, chief forester of the United States, who will be asked to transmit it to the President.

According to the *Chronicle* hundreds of thousands of acres of land in Butte, Plumas and other counties have been grabbed up by timber men

on one pretext or another. The scandal has grown to such proportions that a special commission from Washington is in this State, rigidly instructed to learn all the facts and to report them faithfully. Old mineral claims upon which there are mining plants have been grabbed under one law, and the placer location law has been used in another way to grab vast areas of the finest timber land.

The Del Norte miners, having set about the development of gold and copper deposits, formed a mining district. The by-laws adopted provide that no land can be held finally as mineral land until a shaft ten feet deep has been sunk, until mineral has been discovered and until assessment work has been regularly and fully performed on each claim.

Then, not satisfied that they were protected against the land grabber after these precautions, the miners have resorted to the new and striking expedient of putting in shape a petition, intended finally for the President of the United States, in which the request is made that 161,280 acres, included in seven townships in Del Norte County, shall be made a part of the Klamath forest reserve by the Government. No such action has ever been taken before by miners in the United States. At no time before have miners thus confessed fear that their holdings would be made unstable through the agency of land sharks.

Mineralogist Aubury has recommended to Forester Pinchot that the petition be granted.

In Mississippi

Some idea of the forestry work at the Mississippi Agriculture College may be gained from a recent letter from Prof. George L. Clothier, who says: "I have to plant 40 to 50 bushels of hickory nuts if I can get them, transplant about 50,000 forest trees, get my nursery ready for next spring's planting, order pecan trees for planting in December, and get seed corn from farmers over the State to start my breeding experiments, besides teaching three hours per day."



HON. JAMES RUDOLPH GARFIELD

Who will become Secretary of the Interior on March 4, 1907

It is a matter of reassurance to the readers of FORESTRY AND IRRIGATION that when Mr. Hitchcock retires from the position of Secretary of Interior he is to be succeeded by a man of such high integrity and forceful personality as Mr. Garfield, at present Commissioner of Corporations. The Department of the Interior, controlling as it does the Reclamation Service and Public Land administration, is of special interest to the readers of this magazine. Through Mr. Garfield they may justly expect a vigorous handling of these important affairs, for he has, throughout his public career shown himself particularly able in administrative work.

Mr. Garfield was born at Hiram, Ohio, Oct. 1, 1865, the son of James Abram Garfield (20th President of the United States). His preparatory education was received at St. Paul's School, Concord, N. H., and graduated from Williams College in 1885. Later he studied law at the Columbia Law School and was admitted to the bar in 1888, and established a practice at Cleveland, Ohio. Mr. Garfield has been a member of the United States Civil Service Commission; and in February, 1903, was appointed Commissioner of Corporations, in the U.S. Department of Commerce and Labor. He is a trustee of Williams College, and President of the Board of Trustees of Lake Erie College, Painesville, Ohio. He is also a member of the Keep Commission.

THE MINING INDUSTRY AND THE FORESTS*

Great Need of Proper Forest Utilization if
Miners are to have Undisturbed Prosperity

BY

LEWIS E. AUBURY

State Mineralogist of California

THAT there is urgent need for more national and state legislation in regard to the protection of our forested areas, both from fire and the operations of timber speculators, is a subject which I believe is worthy the attention of the American Mining Congress.

The general opinion seems to be that the Government is looking to such protection, and that the individual need not concern himself with matters which our senators and representatives are supposed to attend to. Now, I do not wish to be understood as criticising the very efficient work of the present Forest Service, nor the able efforts expended by Mr. Gifford Pinchot to protect our forests. To President Roosevelt we owe more than to any other chief executive for the carrying out of beneficent forest reserve policies, but we must look to the future when we may not have a Roosevelt to direct, nor a Pinchot to carry out a policy similar to the present one.

The miners, as well as every class of citizens who have the welfare of our country at heart, are one and all agreed that our forests must be protected. No public movement of magnitude has ever taken up the subject of forest protection as it deserves; and while there may have been a few societies interested in a way, passing resolutions, etc., further than that the subject has not been pressed.

Some may say we have our present forest reserves, and that additional reserves are being created, and that when permanent lines are drawn, defining the reserves, the question will

be settled. Do not be too certain in that direction. Let me remind you that timber is becoming scarcer year by year, and that the present available supply, even including that in our present forest reserves (which up to July, 1906, occupied an area of 102,329,877 acres), will contain only sufficient timber to last for another twenty-five years, if the present wasteful methods are continued.

Then let us consider the number of acres of government timber land outside of the reserves, now open to entry, and which also contain marketable timber. Let me assure you that this area is very limited.

Then let us consider the amount of timber land owned by corporations and individuals west of the Mississippi River. This area is very large, but the number of owners is very small. In fact, this large domain, involving millions of acres, is owned or controlled by about *twenty-five* individuals or corporations, commonly called "timber grabbers," who appear to have an insatiable appetite for desirable timber land, their desires for possession leading them to endeavor to secure these lands by hook or crook, and more often it is by "crook."

No one has yet been able to ascertain what the "capacity" of the timber grabber really is, nor when or where his depredations will cease. He never sleeps, and while you are congratulating yourself that the timber you need for mining purposes is perfectly safe in the forest reserves, and can be drawn on when required, he and his allies are at work framing some meas-

ures to cut off a slice of the reserves. Now, I do not wish to be classed as an alarmist, nor do I wish to have you consider this merely a theory. It is a fact that, notwithstanding the policy of the President to enlarge our present forest reserves for the protection of the timber and the conservation of our water supply, attacks are constantly being made on this policy, and efforts are likewise put forth from time to time to have thrown open to entry (so that they might be located by agents of the speculator) lands now in permanent reserves. You might ask, "How could this be accomplished when our lands are safe-guarded by the agents of the Government?" Let me again say, "Do not be too sure of that." Were *all* Government agents trustworthy, our fears might be quieted; but I am sorry to say that such is not the case, and that there is often collusion between the timber grabber and Government officials, as has been demonstrated in the past. I might add, also, that in this I speak not from hearsay, but from personal knowledge.

The developments in the Oregon land fraud cases, which were made public during the past year, and in which Government officials, a United States Senator, and prominent citizens were convicted of timber land frauds, only go to illustrate the fact that there is a great necessity for more stringent laws to protect our forests. The illegal acts perpetrated in Oregon are but a speck as compared with those in other Pacific Coast States; and when the methods adopted by some of the holders of these lands to acquire the timber thereon are exposed, they will make a startling chapter.

One of the greatest causes for concern is the fact that most of the available timber land is in the hands of a few individuals or corporations. For instance, in California approximately one million acres of the best timbered land in our state is controlled by one individual.

When we consider our timber land laws which appear to some as being so carefully drawn that they could not be

improved upon, how is it possible that such vast areas could be acquired honestly? Is it not against public policy that such immense holdings, whether acquired legally or not, should be allowed to be possessed by any individual or corporation?

What will be the position of the miner a few years from now when his present available supply of timber shall have been exhausted? He will be at the mercy of the timber baron, unless there is a convenient forest reserve from which he can draw. Then how will it be possible for him to mine his ore at a profit without a cheap supply of timber to draw from? Already timber and lumber prices have begun to advance, and there is no indication that they will ever become lower. If this is the case, it behooves not only the mining, but all other interests as well to look to the future.

There is a necessity also for extreme watchfulness to preserve intact our present permanent and temporary forest reserves against the underhanded methods of the timber grabber. A new danger confronts us which merits deep consideration. It was thought that the forest reserve policy would protect all classes within the lines of the reserves, particularly the miner, and that none but a mineral entry could be made in the reserves; but behold the ingenuity of the timber grabber for contriving means to accomplish his purpose—he files *placer mineral locations*. This has been done in California in the temporary and permanent reserves, and filings aggregating approximately one million acres have already been made on timber lands, but a small percentage of which have any evidence of being mineral in character. Not only is this class of locations illegal, but the methods of the individuals making them serve to cast an onus on our industry.

This again brings up the question of an available supply of timber for the miner. If such placer locations on timber land in temporary and permanent forest reserves are legalized, I ask you—will the miner not be subject

to the timber baron methods in the reserves as he is outside of them?

Let us hope that the Forest Service will use its best efforts in protecting us from this new danger, and that, before all the vacant lands now in reserves shall have been similarly filed upon, means will be devised to correct this evil. There is obviously a great necessity for more stringent laws, or of stronger regulations by the Forest Service, relating to mining locations in the reserves.

One of our most serious considerations in the matter of forest protection is that of fire, which annually consumes more timber than all other causes combined. Some of the states have passed laws relating to the punishment of persons setting fires or allowing the same to get beyond control, but it is quite evident that these laws are not enforced or that they are not sufficiently stringent to prevent the recurrence of the annual fires.

In my opinion, the attention of the different state legislatures should be directed to the necessity for the enactment of rigorous laws, or to the enforcement of their present laws concerning the setting of forest fires.

In considering the various subjects relating to forest protection of which I have spoken, I trust that my statements, if they meet with the approval of the Mining Congress, as well as any others which may be suggested looking toward the improvement of conditions which will benefit the miner, will be so firmly placed before the state and government officials that proper legislation and regulations will be enacted. Otherwise, if we procrastinate, and are not granted fuller protection, we shall some day awaken to the fact that we are endeavoring to run our quartz mills with an empty ore bin.

FOREST MENSURATION*

Review of Professor Graves' Excellent New Text Book for Foresters

IN his "Forest Mensuration," the first text book written for American foresters, Prof. Graves has set a high standard and produced a book valuable in itself and valuable as an index of what is required in the books that are so greatly needed on other branches of forestry. Whoever shall undertake to write a *Silviculture*, a *Forest Management*, a *Forest Utilization*, must be prepared to have his work judged, in some degree, by this. One is therefore glad that the literature of American technical forestry is so well begun.

"Forest Mensuration" deals with the determination of the volume of logs, trees, and stands, and with the study of increment and yield. Under this definition a discussion of log rules is given first place and 48 pages devoted

to them. This is unquestionably necessary, though the fact itself shows how foolish we are to continue the use of a multiplicity of board measure rules, none of which are right, instead of adopting the simple cubic foot unit. Cannot the forest schools, or the Forest Service do something to establish it and gradually do away with all the board measure rules? Foresters and lumbermen are devoting a great deal of time to the problem of a "rational" board measure rule; the same effort expended in another direction would go far towards getting rid of the difficulty entirely.

When it comes to the measurement of trees for the purpose of determining their rate of growth, cubic measure must be resorted to, and Professor Graves discusses fully the various

* Published by John Wiley & Sons, New York.

methods that are employed. In this part of the book, as well as in that devoted to the methods for determining the contents of stands, precise formulæ as well as rough and ready practices are described. Indeed a great part of the value of this book lies in Professor Graves' even balancing of

answer as well there is no use spending time over refinements. This principle sacrifices nothing to the true scientific spirit, for if forestry is founded on exact knowledge its practice requires many a rough guess or estimate. This is especially true in this country, where real knowledge of



PROFESSOR HENRY S. GRAVES

Director of Yale Forest School, and author of "Forest Mensuration", the first text book written for American Foresters

the scientific and practical points of view. He recognizes the absolute necessity for the most precise and careful work when the problem to be solved requires it—the rate of growth or the construction of yield tables for instance, but when a short cut will

our forests is yet to be acquired. Not a few of the methods described are of the author's own devising, intended to meet conditions that have arisen in his experience, to yield approximate values and to save work. Another point of value is that each method is made

clear by one or more examples, and where there are several ways of doing the same thing, the preferred one is indicated.

The book is sparingly illustrated, though one finds that all the important instruments and their use are fully explained. To make up for any deficiency that may be felt in this direction the appendix is rich in information that the forester often wants and cannot readily find. It includes a digest of all State laws regarding lumber measurement, a full list of works on Forest Mensuration, tables of cubic volumes, volume tables and form factor tables for the most important species—European and American, and the most trustworthy yield tables.

In the use of technical terms the book consistently employs those recommended by the Society of Ameri-

can Foresters, and adopted by the Forest Service. Except that *increment* is used for *accretion*—"increment borer," and *system* for *method*, "selection system," a few times the book does much to establish the preferred technology.

One can scarcely rate Professor Graves' book too highly. The style is clear and direct and the practical purpose to be served is never lost sight of. If faults be sought, the greatest is probably found in an excess of explanation. There is a little of the lecture room which might have been spared. Minor errors of typography are unfortunately quite common, some of the tables are not well placed, e. g., that on page 237, and in the table of metric contents of cylinders, pages 286 to 393, feet instead of meters appears throughout.

A. G.

PROGRESS OF RECLAMATION WORK

BY

F. H. NEWELL

Chief Engineer U. S. Reclamation Service.

AFTER an inspection trip, during which examination was made of the condition of construction work in North Dakota, Montana, Idaho, Washington, Oregon, California, Arizona, and New Mexico, it may be said that in general the work is progressing favorably, and construction has reached a point where results can be seen.

The chief drawback at the present time is the difficulty of securing competent laborers. Men who can be had for this western work are, as a rule, restless and rarely stay more than a few days or weeks at any one point. They travel from job to job, staying just long enough to get well fed and accumulate a few dollars, then leave for the next place. The large amount of railroad construction, as well as the number of contracts under way with the Reclamation Service, make it pos-

sible for laborers to strike a new job wherever they stop.

A contractor having on an average a thousand men at work will have on his pay roll for the month from 2,000 to 3,000 names. There is a small army of laborers tramping backward and forward along each railroad line, the greater part at present being headed, of course, for California and the Southwest in general.

The difficulty in obtaining and holding good labor and the increase in the cost of materials have resulted in putting out of business a number of small contractors and subcontractors, especially those who took their contracts six months or a year ago. The outlook for the future is also so uncertain that it is extremely difficult for contractors to bid with any degree of confidence, and hence there are very few proffers for future work. This

condition, holds not only for the Reclamation Service, but also for the railroads. On one extension four different contractors in succession have thrown up the work during a period of six months.

The largest work of the Reclamation Service now in hand is the Roosevelt dam in Arizona, the foundation of which is now in and is approaching the river level. If the floods in the Salt River do not occur for a month or two, the foundations, which cover

about an acre in extent, will be above water level.

The Laguna dam on the Colorado River, 12 miles above Yuma, is being successfully pushed by J. G. White & Co., of New York City, and its success is now assured through the closing of the break in Colorado River some 30 miles below on Mexican territory. The gap was closed by the Southern Pacific Company after weeks of great exertion and the expenditure of many hundred thousands of dollars.

FORESTRY IN CANADA*

A Careful Discussion of the Forest Wealth of the Dominion with Suggestions as to its Proper Exploitation

BY

JUDSON F. CLARK

IN the case of most crops produced by the soil there is a distinct seed time and harvest and the methods of the seed time are as different as may be from the methods of the harvest. Wood crops form a notable exception to this rule, for normally the new crop is launched by the act of harvesting the crop which is mature. Where there is no wood crop to harvest, artificial sowing* or planting must be resorted to if a wood crop would be grown, but in Canada the areas which must be so treated are limited and comparatively unimportant.

Nature unaided by man has produced vast and magnificent forests and maintained them for ages. The earliest foresters went to Nature centuries ago to learn her method of forest reproduction. They found that wherever trees were removed by decay, wind-fall or other cause, so as to make a break in the forest cover, and thus admit light to the soil, the opening became quickly filled with a vigorous reproduction of young trees. Trees are tolerably prolific seeders, but tree

seeds on germination require light if they are to develop into forest trees. The more light they get the more rapidly they grow, and light may be given them by the removal of the mature trees. Such were the lessons learned from Nature by the first foresters, and the natural laws behind these lessons must ever form the basis of all natural methods of forest conservation.

The forester was quick to see where in man might aid Nature to the advantage of the forest. Nature's method of waiting an age for the trees to disappear after they had passed their prime was wasteful alike in time and material. The forester with his ax saved the material and the time. In the virgin forest the fittest to survive occupied the soil, but the fittest to survive were not always the best fitted to supply the needs of man. This was remedied by the forester in the succeeding crop, by favoring as seed trees those kinds which, because of rapidity of growth or quality of product, were regarded as the more desirable.

* Paper read by Mr. Clark before the Canadian Forestry Association, Vancouver, B. C. September 25-27, 1906.

THE CANADIAN FOREST PROBLEM.

There can be little doubt that the most important problem before any Canadian forest administration is that of translating the facts of these introductory observations into everyday business practice. The solution of the problem will be reached when a system of sale of public timber is evolved and made effective by which the State and the lumbermen become partners with mutual profit in the work of renewing the forest by the act of logging the mature trees.

THE IMPORTANCE OF SELLING RIGHT.

Lumbering is very much like any other business in that it is conducted for what profit may be made by the operators, and rightly so. This being the case, it is evident that the nature of the agreement entered into by the State as the seller of the timber and the lumberman purchaser will have very much to do in determining the subsequent course of events. If the State offers its timber for sale under conditions which put a premium on forest destruction, the forests will surely be destroyed, all kinds of forestry propaganda to the contrary notwithstanding. If, on the other hand, the terms of sale put a premium on forest conservation, there is no reason why the forests should not be conserved as a purely business proposition.

Present lumbering methods are devastating the Canadian forests. Why is this? Lumbering is the business of removing the mature timber, and this should improve the forest. It has done so elsewhere for centuries. Not in Europe and Asia alone, but in many places in North America. Why does it not do so on the Canadian timber limits? There are, indeed, isolated examples of improvement by lumbering even here which show the possibilities, but the exceptions to the rule but emphasize the failure of the present policy as a whole.

It is my belief that the fatal weakness of the present system of dispos-

ing of provincial timbers to be found in the fact that the provisions of the agreements entered into by the provinces as sellers and the lumbermen as purchasers place a premium on destructive lumbering. In other words, the terms of sale which have found general acceptance make it to be in the financial interest of the operators to despoil rather than to conserve the forests.

It is my purpose in this paper to discuss two or three salient features, and at least one notable omission in these agreements, with special reference to their influence on the character of the logging which they authorize, and should, but do not, control.

THREE AXIOMS.

Before entering upon what may prove to be controversial ground, it seems fitting to state three propositions which I think will be accepted as axiomatic for Canadian conditions. These may later serve as landmarks when weighing the pros and cons of individual propositions.

1. The main object of all forest management should be to insure the permanency of the lumbering and other wood-working industries by providing a permanent supply of logs, which is their raw material. Incidentally, or at least secondarily, forest management aims to regulate the flow of streams, to secure revenue, to ameliorate climatic conditions and to provide a playground for the people.

2. Wherever forests naturally flourish they may be perpetuated and improved by conservative lumbering. The white pine and the Douglas fir are among the best trees in the world for this purpose.

3. If the forests are to be saved, it must be with the sympathetic coöperation of the men who cut the trees. Nor is this at all a matter of regret, for no class of citizens are more vitally interested in the perpetuation of the forests or would do more to that end than the lumbermen.

SALE BY PUBLIC AUCTION.

The principle of valuing stumpage for sale purposes by offering it at public auction has long found favor in the older provinces, and I note that British Columbia has recently taken legislation providing for its adoption. There can be no doubt that public auction after ample advertisement and opportunity for inspection is by far the simplest, most equitable and, above all, the most satisfactory method of determining the market value of standing timber.

This sale by public auction may take either one of two forms: (1) The stumpage dues (i. e., the price to be paid per thousand feet when the timber is cut) may be fixed in advance of the sale, and bids may be asked for a lump sum or "bonus," which will represent the estimated value of the stumpage over and above the fixed stumpage dues, or (2) bids may be asked on the amount of stumpage dues to be paid per thousand feet board measure when the timber is cut.

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(1) That it yields at once a large revenue to the provincial treasury; and

(2) That it gives the purchaser of the stumpage a larger interest in protecting the forest from fire.

ADVANCE PAYMENT OF FOREST REVENUE.

The payment in advance in the form of a bonus of a portion of the estimated value of the stumpage to be cut during a period of years is in reality a discounting of the future revenue-producing capacity of the forest. This method of realizing a large present return from what is a permanent provincial asset capable of yielding a regular annual income can, it seems to me, be justified only as a means of meeting a financial emer-

gency of the gravest character. It is worthy of remark in this connection that even the stress of war has never led the forest-owning countries of Europe to resort to this method of temporary relief for their depleted treasuries.

FIRE PROTECTION.

It is evident that the payment in advance of a portion of the value of the timber must give the lumberman a larger interest in the protection of the timber purchased from fire. The advantage to the forest of the interest thus created is, however, more apparent than real. The interest created centers naturally in the protection of such timber as is available for the ax under the terms of his purchase. The greatest danger from fire is not, however, on areas bearing mature or semi-mature timber, but on cut-over lands and such as bear quite young coniferous stands. It is evident that the motive for protecting an area from fire, created by an advance payment of stumpage, disappears as soon as an operator removes all the timber in which he has a financial interest. It might be added that it is a mistake to suppose that in determining the amount of "bonus" which he is prepared to bid on a proposition, the lumberman or pulp manufacturer does not discount for the danger of subsequent loss by fire and the expense involved in future fire ranging.

It will bear emphasis in this connection that a province's ultimate financial interest in young coniferous stands and cut-over lands may be quite as great as in areas at present bearing mature timber; and also that any division of interest or responsibility in so vital a matter as forest fire protection is attended with the gravest dangers.

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1. From the operator's standpoint:
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of a portion of the stumpage cash-in-advance locks up a large amount of capital (or credit) which should normally be used in the development of the business. This prevents the participation in the competition of persons or corporations having no surplus capital (or credit) over and above what would be sufficient to conduct a lumbering business on the plan of paying for their raw material when they require it. This unfair discrimination in favor of the large capitalist as against others of less but sufficient means cannot but have an undesirable effect on the prices realized, in that it limits the number of persons in a position to compete.

(2) *Increased Cost of Inspection*—It greatly increases both the cost and the time required to make an adequate inspection of the tract offered, in that the prospective purchaser must estimate the amount as well as the value of the stumpage offered before he is in a position to bid on the proposition. This again limits the competition to the detriment of the interests of the public.

(3) *Cost of Raw Material Uncertain*—The estimates of the amount of available stumpage which can be made by prospective buyers being necessarily only approximate, this method of sale introduces a large speculative element in the cost of the raw material. As a matter of fact, an operator purchasing under the bonus system never knows what his raw material actually costs him until the logging of the tract has been completed.

2. From the standpoint of the province as seller:

(1 and 2) That the bonus system of auction operates disadvantageously to the province in that it causes much irregularity in the forest revenues has already been commented upon; as has also its undesirable tendency to limit the number of competitors in a position to bid at timber sales.

(3) *Large Losses to Revenue*—In the absence of accurate knowledge as to the amount of standing timber on a limit, the purchaser must bid on the

basis of an amount which he is confident is there and availably located, after discounting for all uncertain factors. Should there prove to be twice or three times as much merchantable timber found before he is through cutting—as has repeatedly occurred—the difference between the market of this "found" timber and the nominal stumpage dues finds its way into the pocket of the operator instead of the provincial treasury, as would have been the case had the amount of the dues been the consideration determined by public competition.

A similar condition obtains on limits on which the right to cut extends or is extended over a long period of years. Advances in market prices, together with changes in uses, methods of manufacture and means of transportation, are constantly adding to stumpage values. These influences, together with the natural increment by growth, have made valuable much timber which because of its small size or unfavorable location was thought to be wholly unmerchantable at the time of the sale, and as such failed to have any influence on the amount of bonus paid. The whole value of this timber belongs in equity to the province, but under the bonus system of sale the nominal stumpage dues only, representing in many cases but a small fraction of the market value, reach the treasury.

On the other hand, it is true that if the amount of merchantable timber should prove to have been overestimated by the purchaser and he should fail to find as much as he paid for, the province stands to gain at the expense of the lumberman. Such a contingency is rare indeed, and is quite as undesirable as the reverse.

(4) *Bonus System Means Close Cutting*—Quite overshadowing any objection which may be taken to the bonus system of sale, from the standpoint of present revenue returns discussed above, is its baneful influence on the future production of the forest. Its whole tendency is toward clean cutting as contrasted with the opposite tendency where the amount to be paid

per thousand feet cut is made the basis for the auction.

Assume, for illustration purposes, a pine stand estimated to cut ten million feet of mature timber, which has an average market value of ten dollars per M as it stands, or a total of \$100,000. If sold at public auction on a stumpage basis for \$10 per M, the operator will cut no trees which when manufactured will not yield at least \$10 per M over and above the cost of manufacture. Suppose, however, that \$80,000 of the purchase price be paid cash in advance in form of "bonus," with the stipulation that the remaining \$2 per M be paid as stumpage dues when the timber is cut. The same operator who in the first case found it in his interest to cut no trees which were not worth \$10 per M on the stump will now find it in his interest to cut whatever may have a stumpage value of \$2 per thousand. The cutting of the young pines having a stumpage value of between two and ten dollars per M may under some circumstances be the main difference between good forestry and destructive lumbering.

(5) *Bonus System Places a Premium on Violation of Cutting Regulations*—Should it have happened that in the sale of this block of pine the province should have reserved trees required for seed purposes, or all trees below a set diameter limit that they might form the basis of future cuttings, it is evident that a purchaser under the bonus system having advanced \$80,000 in cash, and being in a position to reap a large profit from cutting the reserved trees (because of the low dues,) would be under a very great and constant temptation to do so. It may indeed well be doubted if the enforcement of reasonable cutting regulations be at all practicable under this system. Certain it is that up to the present it has not been successfully accomplished.

AUCTION SALE BY THE THOUSAND FEET.

The placing of the whole payment of the lumberman's price for the logs as stumpage dues of so much per thou-

sand feet, to be paid when the logs are cut, and the determination of the amount of the price by public competition meet every objection which can be taken to the bonus system of auction, whether viewed from the standpoint of the operator or that of the province.

Large capitalists who can command sufficient credit to deal in timber lands under the bonus system of auction would very probably not look with favor on a change to a form of auction which would divert a much larger proportion of the natural increase in stumpage values to the provincial treasury. It would, on the other hand, be warmly welcomed by operators of limited capital and would work injustice to none.

Its practical application on a very large scale on both public and private lands has abundantly proven its practicability and efficiency and its special value as an aid to conservative forest management.

It will bear emphasizing here that what is said below in regard to the desirability and necessity of defining and protecting the rights and duties of both parties to sale contracts applies equally to sales on a stumpage basis. Experience has shown that the point to be especially cared for under this form of sale is the prevention of waste of inferior material in the woods. Neglect of this matter may lead to serious loss and bring undeserved discredit on the system.

CUTTING REGULATIONS.

Wherever State or private forests are managed with a view of continued wood production, the most important feature of a sale of standing timber is the agreement as to the rights and duties of the contracting parties. This usually takes the form of a code of regulations specifying what trees are to be cut, the care to be taken in the felling and removal of the timber and similar matters.

These cutting regulations are, of course, drawn up in advance of the sale, and the prospective purchaser

makes his bid with a full knowledge of what will be required of him should he be the successful bidder. A feature of these agreements is usually the giving of a bond by the purchaser as security for the faithful performance of the contract in a accordance with the regulations.

A FATAL OMISSION.

The dearth of any effective measures to control the cutting on Canadian limits is an outstanding feature of the present forest policy or lack of policy. Perhaps the forest departments have acted on the theory that the lumberman's interest in future supplies of logs would insure careful and conservative cutting. Perhaps it has been because there has been no public demand for it—the public knowing nothing whatever about it. Be the cause as it may, the absence of such regulation has long since ceased to be a danger merely. To-day it is nothing short of a disaster; a disaster alike to the future of the lumbering industry and to the future forest revenue.

RETROACTIVE CUTTING REGULATIONS.

The reservation by the provinces of the right to change from time to time the terms under which the timber already sold might be logged is of interest in this connection. If I mistake not, British Columbia has also adopted this feature in her recent forest legislation.

In so far as the rights reserved by this provision are exercised for the general public good in meeting unforeseen or unforeseeable contingencies, the reservation serves a just and useful purpose. In so far, however, as it is merely an aftersight method of providing regulations for the control of logging operations which ordinary foresight would have provided in advance of the sale, it must be regarded as unwise and unjust, and, therefore, impotent. Certain it is, were the powers thus reserved at all frequently called into requisition, it would quickly transform the purchase of public timber from a business proposition to a

mere gamble, with a vast deal of lobbying and wire-pulling thrown in. Needless to say, such a state of affairs would work great injury to the lumber interests and to the forest.

GROUND RENT TAXATION.

A feature of all Canadian timber sales is the imposition of a land tax or "ground rent" per unit of area. British Columbia has made the imposition of a very high land tax a distinctive feature of her forest policy.

If the province grows the timber and merely sells the stumpage when it is mature, distinctly specifying what trees are to be cut and how, and when they are to be cut, there can be no objection to the payment in this way of a small portion of the market value of timber sold, and it may indeed serve a very useful purpose in preventing purchase for speculative purposes by others than bona fide operators.

Should, however, the responsibility for caring for future wood crops be left to the lumberman, as it has been in the past, it will be necessary for him when planning logging operations to consider carefully whether it will pay him to cut with care that he may return again after a period of years for a second crop—reasonable safety from fire being assured—or whether the tax will eat up the profit of any yield that he may hope for over and above what can now be realized by cutting clean without regard to the future. This is the only point of view from which the lumberman as a business man can regard the logging of lands under his control.

The following table gives the annual "ground rent" payment per square mile for the different provinces and on Dominion lands, and the sums to which these annual payments amount for different periods of from 30 to 100 years. In this computation money is reckoned to be worth 6 per cent compounded annually, which is below rather than above the mark for capital invested in immature forests on wild lands.

RELATION OF "GROUND RENTS" TO CONSERVATIVE LUMBERING.

Ontario and Quebec....	\$3	\$251	\$492	\$923	\$1,686	\$5,611	\$18,418
Ontario (recent sales) and Dominion lands east of Yale, B. C.....	5	419	820	1,539	2,809	9,352	30,697
New Brunswick.....	8	670	1,312	2,462	4,495	14,964	49,114
Dominion lands west of Yale	32	2,682	5,150	9,848	17,979	59,856	196,458
British Columbia.....	140	11,732	22,967	43,085	79,118	259,195	836,759

From this table a lumberman may see at a glance what his tax will be when he returns for a second logging on his lands. To make a second logging profitable he must find on his return a stumpage value, over and above the then government stumpage dues, sufficient to offset the two following items before he can reap any return other than interest for his invested money:

(1) The value of the trees which he refrained from cutting at the first logging, together with compound interest on this value at, say, 6 per cent.

(2) The tax bill, which at \$5 per annum per mile, will have amounted to

\$419 at 30 years,
1,539 at 50 years,
9,352 at 80 years,
30,697 at 100 years.

Particular attention is directed to the manner in which the tax bill runs up the longer the time between loggings. This is the most significant feature of all taxation where the tax is annual and the return periodic.

Where the lumberman is the forerster the whole influence of a ground rent is toward early utilization and clean cutting, with the abandonment of the land after the destruction of the forest. The practical effect of this tendency in any given case will be in proportion to the amount of the tax. In Ontario and Quebec, where the rate is \$3 per square mile over large areas, the injury is least; in British Columbia, where recent legislation has placed it at \$140 per mile, it will be greatest.

Taxation at \$140 per mile can but have one effect: Lumbermen will aim

to remove at a single cutting whatever will earn a dollar at the moment, without regard to the future, for under such a policy of taxation it would be impossible to hope for satisfactory returns from conservative lumbering.

The imposition of a ground rent has been defended as a means of forcing the lumbermen to relinquish their holdings of cut-over lands to the province. If the lumbermen have any property rights in limits from which they have removed the purchased timber, it would surely be unfair to take this means of dispossessing them. If, however, their rights terminate with the removal of the purchased timber, other means can surely be found by which the province can obtain possession of its own. Certainly, it cannot be expected that lands will be surrendered on account of "ground rent" taxation without first stripping them of whatever might be marketed at a profit.

The policy of selling vast blocks of timber and pulp wood decades in advance of trade requirements, to be the happy hunting grounds of timber land speculators, has cost the forest revenues millions of money, and will cost them many millions more. The province of Ontario has been very much more conservative in this regard than others which might be mentioned. And yet it would probably be safe to say that the average log cut in 1905 in the province of Ontario was sold a quarter of a century ago. This, of course, means that the average 1905 log is paid for at a price which has long since ceased to represent more than a fraction of its market value.

A reasonable time must of course

be allowed for the removal of timber sold, but there is no justification for the enormous sacrifices in ultimate revenue made by the provinces by this practice.

Occasionally sales in advance of trade requirements have been prompted by a demand for the land for the purpose of agricultural settlement. More rarely the motive has been to utilize timber especially endangered by fire, but without question the controlling motive in the great majority of cases has been to secure for present revenue the comparatively trifling sums to be paid as "bonus."

A SALE POLICY.

To insure that my criticism be constructive rather than destructive, I submit in conclusion an outline of a method of disposing of Crown timber which appears to me to offer a simple, practical and businesslike solution of the problem. It might be added that this method of sale in all its essential features has already proven its efficiency in practice in large transactions and under conditions not unlike those obtaining on the Canadian timber lands.

Preparatory—A first step in the preparation for a sale of timber should be to make an estimate of the quantities of the different kinds to be sold, for publication with the advertisement of the sale. An estimate of the value would also be made, this latter for the use of the forest department in determining their reserve bid.

Advertisement—The advertisement in the case of large sales should be published at least a year in advance of the auction, that ample opportunity may be given for completing business arrangements looking to purchase and for the exploration of the tract by prospective purchasers.

The advertisement should state the location and area of the tracts offered, the approximate stand of the different kinds of timber and the time and place of auction. Intending purchasers should be invited to apply for information regarding the rules and

regulations governing the cutting and removal of the timber, the manner of payment and other details.

Cutting Regulations—The cutting regulations should be prepared with special reference to the individual tracts offered for sale and would be governed by local conditions.

In general they would include:

The designation of the timber to be cut and, conversely, specifically prohibit the cutting of timber not offered for sale—for example, immature timber under a set diameter limit.

Provision for care in the felling and in the removal of the timber.

Provision for the prevention of waste by limiting the height of stump, by prescribing the use of the saw where practicable and by providing for the utilization of inferior materials.

Provision regarding the disposal of the debris—such as lopping tops, burning brush, etc.

The time limit for the final removal of all timber sold.

Specifications as to measurement of timber logged.

Adequate penalties for violation of cutting regulations, as, for example, payment at double the regular purchase price for any merchantable timber left in the woods by the loggers.

Time and manner of payment.

Provision for a bond to insure the faithful performance of the contract by the purchaser.

Method of Sale—By public auction, bids being asked on the amount to be paid per thousand feet when the timber is cut.

Ground Rent—To prevent speculative purchase by others than bona fide operators a fairly high ground rent per mile might with advantage be provided for. The payment on account of ground rent for any particular year might be made to apply on the stumpage dues account for the same years. This would throw the whole weight of the ground rent taxation on the purchaser who failed to operate, and would at the same time provide automatically for release from taxation

immediately that he actively undertook to carry out his obligations.

Unit of Area—The square mile forms a desirable sale unit. This would give lumbermen of limited capi-

tal and jobbers an opportunity to do business on the public forest lands, and if the number of miles which any one concern may purchase be unlimited no injustice will be done the largest operators.

COURSE IN PRACTICAL LUMBERING AT YALE

Fund of \$150,000 Being Raised by the National
Lumber Manufacturers' Association for Endowment
of Chair of Lumbering—Course Is Now Offered

THE new catalogue of the Yale Forest School shows a number of very important changes, chief of which is the institution of a course in practical lumbering. It will be remembered that the National Lumber Manufacturers' Association has undertaken to raise an endowment fund of \$150,000 for a chair of practical lumbering at the Yale Forest School. This fund has not been completed, but an arrangement has been made by which the new work in lumbering has been started this year.

No full professor of lumbering will be appointed until the fund has been completed, but the work for the present will be under the direction of a committee of lumbermen, consisting of Mr. N. W. McLeod, of the Grayson & McLeod Lumber Co. of St. Louis, and President of the National Lumber Manufacturers' Association; Mr. C. I. Millard, secretary of the Chicago Lumber and Coal Co., St. Louis, and Mr. F. E. Weyerhaeuser, of Weyerhaeuser & Co., of St. Paul. The lectures and the class work will be conducted by practical lumbermen from different parts of the country who are especially expert in different branches of the business. Arrangements are now being made to secure these special lectures, and an announcement will be issued later of the men secured and the subjects which will be taught. In addition to the special lectures, instruc-

tion will be given at New Haven in the economics of the lumber industry in the nation; its position in commerce; industries dependent on it; stumpage prices; upward movement of wood prices; future source of timber supply; transportation of exports and imports; markets; cost of logging of New England second growth and in the longleaf pine, white pine, loblolly pine, southern hardwood, cypress, spruce, hemlock, and Pacific Coast regions.

This work, as well as the field work, is in charge of one of the new instructors, Mr. R. C. Bryant. Mr. Bryant also has charge of the organization of the field instruction. This field work will consist of the preparation of a detailed plan for lumbering a specified woodlot in the vicinity of New Haven.

The students estimate the amount of timber on the tract; investigate local methods and cost of logging and milling; inquire into the character of material demanded by the local markets, and the value of such material. A lumberman who operates portable sawmills in the vicinity of New Haven assists in the field work. He visits the woodlot in company with the students, discusses the most economic utilization of the various kinds and forms of trees, and criticizes the estimates and the methods of logging made by the students.

Ordinarily the senior class has been sent into the woods at Thanksgiving for a trip of three weeks, and again about the middle of April, for the final field practice of the course. This year the class will be held in New Haven during the entire fall term, but will be sent into the woods about March 1st, where the students will remain until graduation, thus confining the field work to one trip. This field work will be conducted in a place where the climate is favorable for work as early as March, and where the conditions are satisfactory for instruction.

During the spring term the students will be given final practice in timber estimating; topographic surveying; laying out logging roads, (both rail and wagon); selection of logging camp sites; construction, equipment and maintenance of logging camps; methods of logging; transportation to mill; handling logs at mill; sawmills, their character, capacity, and management; mill yards, their character and management; practical work in grading lumber; methods of handling and

piling lumber; methods of seasoning or kiln drying; shipment of lumber; markets; business conduct of lumbering operations, including logging camps, sawmills, etc.; fire protection, and other phases of forest management.

The work in lumbering during this term will be organized by Mr. Bryant, and the topographic and other work in forest management will be in charge of Mr. H. H. Chapman. It is expected that Mr. Henry Gannett, geographer of the Geological Survey, will coöperate in instruction in topographic surveying.

Inasmuch as the progress of this new course in lumbering is under the immediate direction of a committee of practical lumbermen, the instruction will be of an unusually high character, and eminently practical in character. The best feature of the course lies in the fact that it will afford instruction along a line of practical usefulness which has heretofore only been gained by the graduate forester after a number of years of working experience.

THE EASTERN FOREST RESERVES

Resumption of the Campaign for the White Mountain — Southern Appalachian Bill

IN Boston, on October 31, at the office of Messrs. E. H. Rollins and Sons, an important meeting was held. Its object was to resume the campaign for the White Mountain-Southern Appalachian Forest Reserve bill.

The Society for the Protection of New Hampshire Forests was represented by former Gov. Frank W. Rollins of New Hampshire; its president, Montgomery Rollins, his brother, member of the executive committee; Philip W. Ayres, its forester, and Gen. George T. Cruft, its treasurer, and also president of the White Mountain Board of Trade. New Hampshire was still further represented by Mr. Robert P. Bass, its newly appointed forest

commissioner. The Massachusetts Forestry Association was represented by Mr. Edwin A. Start, its secretary. For the White Mountain Club appeared Messrs. Allen Chamberlain, its president, Harvey M. Shepard, and Prof. J. Rayner Edmands. The American Forestry Association sent its secretary, Mr. Thos. E. Will.

The meeting was brief, but intense. Mr. Shepard reported that the condition of the Presidential range, including Mounts Jefferson, Adams, and Madison, was most discouraging, and that the northern slopes were already practically denuded. Between Mounts Adams and Madison there still remains a beautiful valley, but the lum-

bermen are at work upon it, and, at the present rate, its timber will have disappeared before spring. Through Mr. Shepard's intercession with the owners of the forests about Glen Ellis Falls, these forests will be spared this winter. The situation throughout the entire northern portion of New Hampshire he reported as most grave.

Mr. Ayres, on the authority of Mr. C. C. Goodrich, president of the Hartford and New York Transportation Company, stated that the situation on the Connecticut River is becoming serious. Because of the cutting of the trees on the upper courses of the river, and the consequent denudation of the mountain slopes, silt is coming down at a rapid rate, and the channel of the river and the harbor at Hartford are filling. In consequence, navigation is becoming seriously impeded, the sailing of boats being rendered virtually impracticable when the mills up stream close their dams and so hold back the scanty supply of water. On the other hand, floods occur, to the serious damage of all concerned. The Merrimac is also seriously affected. These facts, it was argued, showed the problem to be one concerning not only New Hampshire, but New England as a whole.

The status of the bill was discussed, and satisfaction was expressed that so much had already been accomplished; it was, however, brought out, first, that if the bill is not passed by March 4th next, all the ground gained will have been lost, and, second, that much of the timber which it is hoped to save will, before legislation can again be secured, have been irretrievably destroyed. The matter thus becomes one of "now or never."

That the desired legislation might be effected it was deemed of prime importance that the bill be given a favorable place on the calendar, that it may be reached before the close of the session. To this end, the good offices of the Speaker were felt to be indispensable, while at the same time it was recognized that hitherto he has been unfriendly toward the measure. It was

argued that, to bring home to him the importance of the measure, strong men from New England should be enlisted and brought to use their influence, in all right ways, upon him; also, that all interested should make plain to their representatives the vital importance of the bill.

That the progress thus far made was due primarily to the energetic, faithful work of friends of the measure largely outside of Congress was recognized, and strong appreciation was expressed especially for the efforts of Gov. Glenn of North Carolina and his co-laborers from the South. The efforts of Mr. James H. Cutler, of the executive committee of the American Forestry Association, were also felt to have been invaluable.

For handling the New England side of the work a committee of three, consisting of Messrs. Allen Chamberlain, E. A. Start, and Philip W. Ayres, was appointed to meet on the Monday following to formulate plans for a general conference in Boston of representative men from all the New England States, including Congressmen Weeks and McCall of Massachusetts.

Secretary Will, of the American Forestry Association, was asked to communicate with the South, with a view to co-ordinating the efforts of that section with those of New England in a concerted effort.

The Boston *Transcript* of October 31st gave practically a column report of the meeting, wholly sympathetic. Copies were at once sent by Secretary Will to Gov. Glenn and the Forester, Mr. Gifford Pinchot.

On Saturday, November 10th, Mr. Cutler returned from Illinois, where he had gone in the interest of the bill. Secretary Will reported to him the results of the Boston meeting, and, on the Monday following, Mr. Cutler proceeded to Raleigh, N. C., with the view of seeing Gov. Glenn and others.

On Saturday, November 17th, Mr. Cutler was again in the national office of the American Forestry Association with the report that he had twice seen Gov. Glenn and that the latter was in-

tensely interested, and agreed to do his utmost to arouse the people of his State to the importance of promoting the proposed legislation; and, in addition, to come in person to Washington and use every effort to secure the passage of the bill. Mr. Cutler will return to Raleigh in December, and again in January, in the interest of the measure.

Secretary Philip W. Ayres writes that the committee is planning a

meeting of important business men and congressmen before the end of November, and that they are bringing other New England States into line. In Portland he met the governor of Maine and a number of prominent men who will write their representatives and will otherwise aid. Secretary Ayres is also in touch with other New England people who helped last year:

FOR A NATIONAL WOOD--TESTING LABORATORY

Meeting Held in Washington to Forward the Movement—
Many Prominent Organizations Send Representatives

ON November 16th an important conference was held in the Atlantic Building, Washington, D. C., to consider the establishment of a national wood-testing laboratory. There were present Messrs. Edward Stinson, of Baltimore, Md., representing the National Hickory Association; Max Robinson, Martinsburg, W. Va., representing the National Wagon Manufacturers' Association; Henry C. McLearn, Wilmington, Del., representing the Carriage Builders' National Association; Rufus K. Goodenow, of Baltimore, Md., representing the National Association of Box Manufacturers; O. B. Bannister, of Muncie, Ind., representing the Western Wheel Manufacturers; Geo. K. Smith, of St. Louis, representing the National Lumber Manufacturers' Association; T. J. Moffett, of Cincinnati, Ohio, representing the National Hardwood Lumber Association; Gifford Pinchot, William L. Hall, and others, representing the Forest Service, and Thos. E. Will, representing the American Forestry Association.

This conference was held as a result of action taken by a large number of associations of manufacturers and users of forest products strongly fa-

voring the establishment of such a laboratory.

Mr. Gifford Pinchot, responding to the request of the conferees for a statement, expressed his warm appreciation of the interest taken in the project by the visitors present and the industries they represented.

Two points, he said, are absolutely necessary to conserve the timber resources of the United States: one is the greater economy in the use of timber—to get the most out of it—and the other is the conserving of present forest resources by elimination of waste and fire, and wrong methods of lumbering.

Mr. Pinchot next explained that he was not in position to push the bill for the establishment of the laboratory, but that if the thing was to be done it would have to be done by the gentlemen present and their friends. He expressed the belief that there should be no great trouble in securing the appropriation if the conferees would say emphatically that they wanted it.

Mr. Wm. L. Hall, who has given much thought to the matter of establishing a national wood-testing laboratory, then outlined the work to date and the plans for the future. He said:

"I can give you a brief history of the work as it has developed, and outline the work as we think it ought to be handled from this time on.

"In 1890, when the Division of Forestry was a very small affair, consisting of six or eight men, the testing of timber was begun in connection with Washington University of St. Louis, and some tests were made on, I think, thirty-two different kinds of wood, most of which were pretty well known at that time and in general use. Those tests were very useful, as I think most of you who know about them will bear me out, useful to engineers and to lumbermen who wanted to know about the value of the timber that they had to work with and the timber they had in view to work with. Those tests went on for five or six years. There came a time when other work pressed and the testing work was stopped, not to be resumed for several years. In 1902 plans were devised for beginning this testing work again. The man who prepared the plans and who has had charge of practically all of the work done in testing since that time is Dr. W. K. Hatt, of Purdue University, where we have our main laboratory. In addition, a very small laboratory has been furnished the service by the Forest School at Yale University and small laboratories by the Universities of California, Washington, and Oregon.

"Some of the tests we made were on large timbers, such as bridge timbers, up to the size of 8x16 and 16 feet long. About a year ago we began to see a field for doing good, useful work, in co-operation with the manufacturers who use wood. We saw that there was great waste through not having definite information about timbers so that they could be put to the uses that they were actually useful for. For instance, in the manufacture of wagons, we found that there was a great need for reliable information on what timber can be used for different parts of a wagon—spokes, hubs, rims, tongues, axles, and boxes, and everything that goes into a wagon. With definite in-

formation the wagon builder could use wood that he is not now using, and still have just as good a wagon. We found that the manufacturer was tied down to a considerable extent by the demands of the trade as to the kind of wood that should go into a wagon.

"We also saw need of studying other questions in connection with the manufacture of wood into salable products. The question of kiln-drying has come to be a most vexatious problem. We find need of making studies of the question of drying. It is a pretty intricate question, as most of you know, and it is far from solved. And there is, in addition, the problem of finding the woods which we have not heretofore used which might be used for different things. These are questions which come in right along the lines we have been discussing. There are other problems of vital importance which we can work out in a laboratory of this kind. The problem of using up waste by means of wood distillation is one which confronts the lumber manufacturers, and we should provide for experiments in wood distillation, and similarly for experiments in the preservative treatment of timber, which is a problem of great importance.

"This will indicate to you the work that we see ahead in connection with this project. The point of view of the Forest Service is this: That to do this work in the most valuable way, we must do it not only in close co-operation with your associations—we must do it directly under the supervision of your associations. If this laboratory is secured there should be a general advisory committee of the different associations to help us outline the work of making the tests and to see that we do not work entirely on the theoretical side and leave out matters of practical importance. There ought to be that close connection between us right along."

The delegates of the various associations showed that the co-operation of the Forest Service has already helped their industries in pointing out good substitutes for disappearing species, in

establishing new uses for less commonly known woods, and in demonstrating improved methods of grading their material.

The members of the Conference expressed themselves freely and unanimously to the effect that the laboratory should, by all means, be established, and that every effort should be employed to secure the necessary appropriation.

After discussion it was agreed that the appropriation should be \$200,000.

The following resolution was then adopted:

"Resolved, That it is the unanimous sense of this conference that a laboratory for testing the strength and other characteristics of wood, and for solving problems connected with its economic use, is absolutely essential to the manufacturers and users of forest

products of this country; that we ask these interests to petition Congress for an appropriation of \$200,000 to establish such a laboratory, and that it be under the control of the Forest Service of the Department of Agriculture."

A permanent organization was next effected by the choice of Rufus K. Goodenow as chairman and Thos. E. Will as secretary. These officers were authorized to take such steps as, in their judgment, might be necessary to carry out the resolutions adopted. The formal session then adjourned.

The delegates took lunch at the Cosmos Club at 1 o'clock, and met the Secretary of Agriculture at 2:30 o'clock.

Active steps have since been taken to promote the purpose of the conference.

UNCOMPAHGRE VALLEY PROJECT

How Work is Progressing on One of the Most
Interesting Government Irrigation Works

BY

MORRIS BIEN

Consulting Engineer, U. S. Reclamation Service

THIS is one of the striking pieces of work which has been taken up by the U. S. Reclamation Service. It is intended to irrigate about 150,000 acres of lands in the valley of the Uncompahgre River in southwestern Colorado.

The Uncompahgre River itself furnishes but a small amount of water and is wholly inadequate for the irrigation of more than a small fraction of this area.

In an adjoining valley to the North, is the Gunnison River flowing through one of the most magnificent canyons in the world. The river gorge at this place for 20 miles is a narrow cleft with almost vertical sides, the river bed being in many places from 2,500 to 3,000 feet below the uplands at the

summit of the cliffs. This river for practically its entire length passes through narrow mountain valleys, affording little opportunity for the use of its waters in irrigation.

The Gunnison, which is but little more than six miles in a direct line from the valley of the Uncompahgre, seemed inaccessible for the irrigation of the arid lands in the Uncompahgre Valley because of the intervening mountain range whose summits are more than 4,000 feet above the valleys on either side.

By means of a tunnel through this mountain the waters of the Gunnison are to be brought to the Valley of the Uncompahgre. The tunnel will afford a waterway of about 10 feet by 12 feet and will deliver about 1,300 cubic

feet of water per second. About 17,000 feet of the 30,000 feet of the tunnel have been built.

In the excavation for the tunnel the work was begun at both ends and from a shaft about one-half mile from the western end. The work at the western end has now been connected with the work from the shaft so that all the excavation at the west end is carried on from the west portal.

The material is transported by means of small electric locomotives, which haul ten cars of rock and material, amounting to twenty cubic yards for each train load.

The east portal can be reached only by a wagon road, ten miles in length, which was constructed by the Government. All the machinery and material used at that end of the tunnel is hauled over this mountain road. The western portal is located close to the line of the Denver and Rio Grande Railroad so that the material and machinery are conveniently delivered for the work.

At either end of the tunnel a camp has been established and each is now a village of some 500 people. These settlements are provided with water works, electric lights, sewerage systems, school houses, telephone and postoffice facilities.

From the west end of the tunnel a canal will carry the water of the Gunnison River into the Uncompahgre Valley and from its various main canals and laterals will branch out until the entire irrigable area of the valley has been covered.

The lands in the Uncompahgre Valley lie at an average of about 5,000 feet above sea level. These are practically surrounded by high mountain ranges and the climate in the valley is exceptionally mild and even. The soil is unusually rich, and apples, peaches, apricots, prunes, cherries, wheat, oats, potatoes and sugar beets produce in abundance.

The principal towns in the valley are Montrose and Delta, located on the Denver and Rio Grande. They are thriving and progressive communities and the towns are well built with many attractive office and residence buildings.

The construction of the tunnel and the ditches has been under way since the beginning of 1905, and excellent progress has been made. It is probable that water can be furnished under the project in 1908, and that a system will be running in fully completed form in 1909.

THE RIO GRANDE PROJECT

Work to be Rushed on What will be One
of the Government's Greatest Irrigation Works

THE Secretary of the Interior has executed a contract on behalf of the United States, and approved the bond of Contractor P. Nelson, of San Antonio, Texas, for the construction and completion of a diversion dam and canal for the Rio Grande irrigation project, New Mexico. The contract calls for the construction of six miles of canal, with 321,000 cubic yards of excavation, the furnishing and driving of 35,000 linear feet of round piles and 170,000 feet board measure of

sheet piles, and 2,600 cubic yards of concrete for the sum of \$100,187.50.

The letting of this contract launches the Government on the great work of constructing the Rio Grande project, one of the largest and most expensive of the irrigation works undertaken by the Reclamation Service.

This project contemplates the construction of a huge dam near Engle, New Mexico, to store water for the irrigation of 180,000 acres, 110,000 of which lie in that territory. The cost

of the entire system is estimated at \$7,200,000. The main item of cost is the dam, which will require 300,000 barrels of cement, a large amount of machinery, gates, etc., entailing a heavy outlay for freight. It is estimated that the dam will cost approximately \$5,300,000. It will be 225 feet high, 120 feet thick on the bottom, and 20 feet on top. It will be 1,150 feet long on top of crest. The reservoir thus created will have a capacity of 2,000,000 acre-feet, or twice that created by the Assuan dam in Egypt, and will be the largest artificial lake in the world.

Owing to the great demand made

on the reclamation fund in other localities, the money for this entire project is not yet available. Recognizing the importance of early action in this section, however, the Secretary of the Interior, on December 2, 1905, allotted the sum of \$200,000 for the immediate construction of that portion of the project known as the Leasburg diversion. It is this dam with a canal to connect it with the old Las Cruces system for which contract has just been let. Work will be pushed rapidly during the winter, and it is hoped the water can be supplied to 15,000 acres in Mesilla Valley during the irrigating season of 1907.

THE RED PINE* (*Pinus Resinosa*)

XII—Notes on Forest Trees Suitable for Planting in the United States

THE RED, or Norway, pine generally attains a height of between 70 and 90 feet, and a diameter of 2 or rarely 3 feet. When grown in the open, the tree is relatively short, and branched close to the ground. In the forest the stem is commonly clear for 40 to 60 feet, and the crown is short and open, but broad-spreading.

The distinguishing features of red pine are its thin, scaly, reddish-brown bark, and its slender and flexible leaves 5 to 6 inches long in clusters of two.

RANGE.

The natural range of the red pine is along the northern border of the United State as far west as Minnesota, and southward through the Northern States to eastern Massachusetts, the mountains of Pennsylvania and north-eastern Ohio. It reaches its best development in the northern portion of Michigan, Wisconsin, and Minnesota.

The red pine is adapted for planting throughout most of the northeastern part of the United States. It will not do well where droughts are frequent or severe.

SILVICAL QUALITIES.

The red pine grows best on sandy loam soil, well drained and of moderate fertility, but it also thrives on poor sands when other conditions are favorable. The tree is very intolerant of shade at all ages and therefore suitable for pure plantations only, or for mixtures in which the other species are distinctly slower growing. Its rate of growth is fairly rapid. Measurements made in several New England plantations show an average height of 35 feet and diameter of 6 inches at 30 years of age.

Red pine suffers little from insects or disease. It is moderately fire-resistant and quite free from destructive fungi. When young, the tree is sometimes injured by a white grub which feeds on the tender roots, but the mature tree has few enemies.

ECONOMIC USES.

The wood is somewhat like white pine, though a little heavier, harder, and stronger. It is only moderately durable. It is distinctly valuable for all kinds of house lumber, and when

* Data furnished by Forest Service.

chemically treated makes good posts and ties. In most of its qualities it compares with the shortleaf pine of the South, and with western yellow pine.

PROPAGATION.

Red pine grows only from seed. While the trees do not produce large quantities of seed, and seed years occur at intervals of from two to four years, there is usually a sufficient natural reproduction wherever there are old trees.

The seeds ripen in the fall of the second year after the flowers appear, and may then be gathered and kept over winter in any cool, dry place.

The seeds should be planted in the spring in well-prepared beds, either in drills about 5 inches apart extending across the beds, or broad-cast, and covered lightly with earth well pulverized and pressed down firmly. When the seedlings are two years old they may be transplanted to nursery rows, or set in their permanent places in the plantation.

It is desirable to keep the nursery beds moderately moist, for if too dry the plants will either die or send their roots so deep in search of water that they will be difficult to transplant.

One pound of seed contains about 75,000 grains, and, under average conditions, will plant about 400 lineal feet in drills, or 100 square feet broadcast.

The young seedling develops a strong taproot, but later produces several stout laterals which firmly anchor the mature tree, unless the soil be very shallow.

PLANTING.

For planting red pine it is best to use seedlings two or three years old which have been raised in nursery beds.

The young trees should be set out in the spring, late in April or early in May. They may be planted in furrows or in holes made with a spade, mattock, or planting bar. As a rule, the proper spacing is 4 feet each way, although this will vary in different localities.

It is usually advisable to plant red pine pure, though on good soil sugar maple, beech, or elm might be mixed with it. Any associate must be of slower growth than the red pine, or the latter will be overtopped and suppressed. Mixture with white pine has generally proved satisfactory.

CULTIVATION AND CARE.

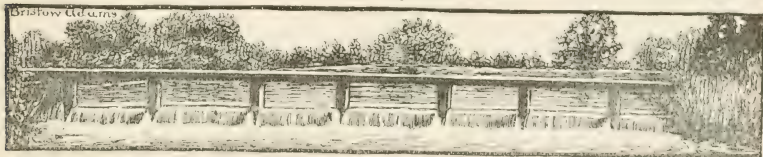
If red pine is planted on cut-over lands, more rapid-growing species such as jack pine, aspen, and birch must be prevented from choking it out. No cultivation is needed, and the protection necessary is from fire and grazing.

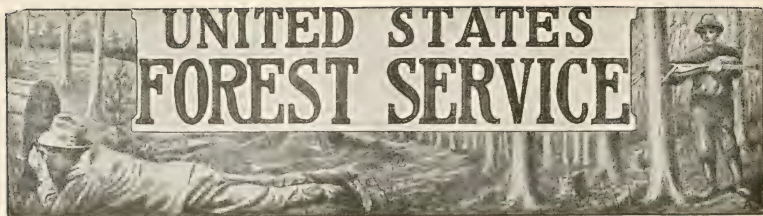
The red pine, being intolerant of shade, very readily clears itself of its lower branches when close-grown, and never requires pruning.

EXAMPLES.

Several plantations of red pine have been made in New England, where this species makes more rapid growth than the planted white pine, since it is unaffected by the prevalent white pine weevil.

A most instructive example of a successful red pine plantation is found near Lake Winnepesaukee, New Hampshire, where it was planted pure and also in mixture with white pine, about thirty years ago. Measurements made in a twenty-seven-year-old stand of these two species show that the red pine has an average height of 34.9 feet and is taller than the white pine.





The Month in Government Forest Work

General Inspection

Assistant Forester Olmsted returned on September 20 from a trip through the Alaska reserves, the particular purpose of his visit being to investigate complaints. He found that most of the complaints were based on misunderstanding of the objects of the reserves, but, since conditions in Alaska differ from those in the Western States, special regulations are apparently necessary.

Mr. Olmsted reports that the difficulties of administration in Alaska are great, since there are no roads, but few trails, and a very sparse population. All travel is by boat.

Forest Management

Forest Supervisor Bartrum has secured the clearing of a portion of a fire break around the Ashland Forest Reserve in the vicinity of the city of Ashland (Oregon) by confining free use to this strip. The forest along the reserve boundary is an inferior stand of yellow pine and red fir. The ground is nearly everywhere covered with a dense growth of chaparral, making fires especially hard to fight. In sales and free-use cases the cutting and piling of the underbrush has been required, as well as the piling of the brush from all trees cut. The ground so cleared has then been burned over at safe seasons. The result is a clear strip of ground, across which no fire can run, and from which back fires may be started with perfect safety. The break has already proved itself useful by stopping two fires, supposed

to have been set by lightning, which would otherwise have been almost impossible to control before they burned through a considerable stretch of timber to a ridge top.

Certain portions along the fire line, however, belong to the Southern Pacific Railroad Company, and the company has given permission to the Forest Service to clear a line on its lands, since this will protect these lands as well as the reserve, and will be a great benefit to the city of Ashland and the country tributary to the lands of the railroad.

Water Shed Studies

Forest Reserve officers, in response to Reserve Order No. 17, recommended examinations of city watersheds in the Mount Graham, Pinal Mountains, Chiricahua, Santa Rita, Santa Catalina, and Tonto forest reserves in Arizona. During the summer Mr. L. C. Miller examined the first three of these reserves and also part of the San Francisco Mountains Reserve. He found no important city watersheds in need of planting, but advised certain utilization planting, and established two small nurseries. The city watershed work on the other Arizona reserves will be continued this fall.

It is found that the Pocatello Forest Reserve offers a watershed project much needed for the city of Pocatello. A nursery, 48 by 72 feet in size, will be started this fall under the direction of Mr. A. E. Oman.

Mr. J. M. Fetherolf, who has been

conducting field work in the Uinta Forest Reserve, finds that the drainage basins upon which Ogden, Provo, Logan, and several smaller towns depend for their water supply, can be greatly improved by forest planting. A good nursery site is available near Kansas.

A city watershed project in the Pecos River Reserve has been reported on favorably in a preliminary report by Mr. H. P. Baker and Mr. F. J. Philips. The Gallinas River and Santa Fe Creek drainage basins contain several good planting sites. Planting will benefit the water supply of Las Vegas and Santa Fe.

Mr. John D. Guthrie, who has been conducting watershed studies and establishing rangers' nurseries in Idaho, has been transferred to the San Francisco Mountains Forest Reserve to take up rangers' nursery work. After he has covered this reserve he will go to the Tonto Forest Reserve for similar duty, and, in addition, make a special study of the conditions in the vicinity of the Roosevelt dam of the Salt River irrigation project.

Rangers' Nurseries

Plans for rangers' nurseries, are beginning to come in from the technical men who have been assisting in starting these nurseries during the summer. Wherever possible, shade frames have been constructed and the ground prepared for seed sowing next spring. The plans submitted will be edited and copies sent to the rangers concerned. Actual work is being undertaken this fall only where permanent headquarters have been established. The nurseries thus started under technical supervision will serve as models for the rangers in undertaking similar work in the future.

Forest Products

The Forest Service will experiment this month to determine the best method of treating fence posts cut from dead lodgepole pine on the Henry's Lake Forest Reserve. Large bodies of burned lodgepole pine exist on

many reserves. Should these tests prove successful, similar work will probably be carried on in other places.

The preservative treatment of western yellow pine telephone poles with creosote oil has begun at Los Angeles. Several different methods of application are being tried, and excellent results have already been obtained, both with a special butt apparatus and in open tanks.

Two experimental pieces of track are now being laid in Washington and Montana on the lines of the Northern Pacific Railway. These are laid for the purpose of testing the effect on ties of metal and wooden tie plates, and the durability of red fir and tamarack ties treated with zinc chloride and creosote as compared to seasoned and green untreated ties of the same species.

Grazing

Mr. A. F. Potter, Inspector of Grazing, has attended stockmen's meetings at Butte and Helena, Mont., and Albuquerque, N. Mex., in the effort to make clear the policy of the Forest Service relative to grazing in the reserves and to correct misunderstanding regarding it. A resolution was adopted at Butte, Mont., in which the stockmen expressed satisfaction with the information given.

Reserve Boundaries

A great many more applications for agricultural land under the act of June 11, 1906, are being received than were expected, and Mr. Kent, who is in charge of the field examination of the lands applied for, has asked for four more men to assist him in the work. Already two reserves—the Priest River in Idaho and the Bitterroot in Montana—have been covered. In the former reserve all but a very few claims were approved and recommended for listing, but in the latter the applications were found to cover heavy timber land and were purely of a speculative character. If cleared, they would, with irrigation, produce good crops, but no water for irrigation was

available, as evidenced by the thousands of acres of cut-over lands outside the reserve, which are not and can not be placed under cultivation.

General Reserve Work

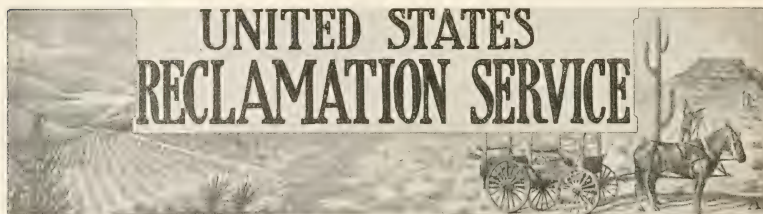
An investigation will be made to determine the extent of damage being done to forest reserves by fumes from smelters in the copper region of Montana. Upon the results of this investigation will depend the action to be taken in a number of smelter cases throughout the West.

Forest Supervisor Coleman, of the Shasta Reserve, has been instructed to build a telephone line on the western portion of his reserve. The proposed line will connect five ranger stations with the office headquarters and will simplify the administration and fire protection. A special feature of the line is a branch connecting with a lookout point, where fires can be seen over a large portion of the reserve and reported to headquarters.

Four miles of telephone line have been completed in the Salt Lake Re-

serve, connecting the rangers' headquarters and the nursery with the supervisor's headquarters. Eighteen-foot red fir poles, 7 inches at the top ends, were used and were set 4 feet in the ground.

Forest Supervisor Charlton, of the San Gabriel and San Bernardino Reserves, will undertake this winter a large amount of fire-line work for the protection of the country in the immediate vicinity of Riverside, and the local residents have subscribed some \$2,000 to aid in this work. The burning of a fire line on each side of the Santa Fe line crossing the Cajon Pass and the burning of wide fire lines through dangerous grass country at the foot of the mountains outside the San Bernardino Reserve probably accounts for the excellent protection accorded the reserves during the past season. The rangers burned this fire line at night when the wind was blowing away from the reserve line, and four or five men sometimes burned two to three miles in one night.



Government Irrigation Work During the Month

Klamath Project

The Reclamation Service has been authorized to purchase the property of the Jesse D. Carr Land & Livestock Company, for use in connection with Klamath irrigation project, Oregon-California. The authority carries with it permission to make a payment of \$170,000, or about 90 per cent of the total purchase price.

Although the natural advantages of the project are great, there have been many annoying delays in adjusting

the details of acquiring property of corporations and land owners required by the Government in connection with the Klamath project. This step will therefore be hailed with much satisfaction by all parties concerned, as indicating material progress. The property acquired by this purchase embraces the Clear Creek reservoir and certain other lands essential to the project.

A large part of the delay was due to the failure of the company to per-

fect title to the property which it desired to sell. Until proper abstracts of title were presented to the Department of the Interior of course no purchase could be consummated. The retention of 10 per cent of the purchase price by the Government is only pending the perfection of title to a small portion of the property.

Another difficulty encountered in the construction of this project was

possible before severe weather sets in, and with this idea in mind have put every available man, including the carpenters, on the concrete work. Twenty-five hundred cubic yards were laid during the month of October. There was one week of continuous stormy weather, and during the enforced idleness sixteen laborers left the camp. The labor problem does not improve, and on this account only half



Tule Lake, Oregon and California; the future site of 1,000 farms of 80 acres; to be drained and irrigated as part of the Klamath Project by the U. S. Reclamation Service.

the lack of transportation facilities. Railroad men have about completed arrangements for the extension of a line into the basin, and indications point to a remarkable development in this section in the near future.

The Pathfinder Dam The contractors on the Pathfinder dam, North Platte irrigation project, Wyoming-Nebraska, are making every effort to get the masonry as high as

the capacity of the plant for laying masonry was reached during the month which has just come to a close.

Work on the Interstate canal and lateral system was also somewhat delayed by stormy weather and the inability to obtain men and teams, but fair progress was made. Concrete work for the seven lateral outlets on the first 45 miles of canal were completed and rye was sown on the em-

bankments to protect them from erosion by wind and rain.

A field party is at work making preliminary location of the third fifty miles of the Interstate canal, and about twenty-five miles were completed in October.

**Gunnison
Tunnel**

On October 26th the first of the concrete lining was placed in the Gunnison tunnel. Uncompahgre irrigation project, Colorado. Work was

crete floor in the west end of the tunnel is already completed. The concrete plant promises to be a very economical one. Gravel is obtained on the top of the hills surrounding the main shaft, which is located 4,950 feet from the west portal. The gravel beds contain gravel and sand of excellent quality in about the right proportion for concrete, and the material is handled only twice between the pit and the well of the tunnel.



Sage brush lands in Klamath Basin, Oregon, to be reclaimed under Klamath Project

begun on this tunnel on January 11, 1905, and on the first of the present month 16,788 feet had been excavated, 757 feet having been excavated during October. The progress made the past month is considered exceptionally good when the character of the material encountered is considered.

Several hundred feet of the con-

Plans are being prepared for an improved form of drop for the South Canal and for the headgates of the Gunnison tunnel. All outside work suffered considerably from the unprecedented snow storms, and it is reported that many thousands of dollars worth of fruit which still remained on the trees was ruined.

Strawberry Valley

The engineer in charge of the Strawberry Valley irrigation project, Utah, reports that 120 feet of the tunnel were completed on the first of the month. Only one shift of eight hours was worked on the tunnel during the greater part of October, as the men were busily engaged in getting ready the buildings necessary to house the men and animals during the winter season. An engine house, power house and blacksmith shop also have been erected.

The road is completed to the east end of the tunnel. This road was one of the important preliminaries to construction, as everything had to be hauled twenty-four miles from the railroad to the west end and about thirty-one miles to the east end of the tunnel. The electric drills which are being given a trial are doing very good work; and it is hoped they will prove a success. A great deal of difficulty is experienced in procuring the services of miners for tunneling.

Large quantities of dead wood which is plentiful on the hill sides have been hauled into camp in anticipation of the heavy snows which may be expected in that latitude.

Purchasing Equipment

The Secretary of the Interior has authorized the purchase of four 10-inch by 16-inch locomotives of thirty-six-inch gage, at \$3,000 each, from the American Locomotive Company of New York City. These locomotives are to be used as a portion of the construction plant for hauling excavated materials for the Cold Springs dam, Umatilla irrigation project, Oregon, which is to be constructed under the direction of the Reclamation Service by force account.

Authority has been given for the purchase of a seventy-ton steam shovel for use in the construction of the Cold Springs dam, Umatilla irrigation project, Oregon. Early in October the Department authorized the Reclamation Service to construct this dam by force account, and in order that no

time might be lost in initiating the work emergency bids were obtained on steam shovels for early delivery. The shovel is to be delivered November 20th, and will cost the Government \$9,000. It will be furnished by the Marion Steam Shovel Company of Marion, Ohio.

The Secretary of the Interior has also authorized the Reclamation Service to purchase forty-four-yard dump cars from the Kilgore Peteler Company, of Minneapolis, Minn., at \$168.75 each; sixty-five tons of rails from the Hoftius Steel and Equipment Company, of Seattle, Wash., at \$34 per ton, and 125 tons of rails from the Kilgore Peteler Company at \$33 per ton. Also the purchase from the Ernst Wiener Company, of New York City, of ten switches at \$35 each. This equipment is to be used in the construction of the Cold Springs dam, Umatilla irrigation project, Oregon, which is being carried on under force account by the Reclamation Service.

The Reclamation Service has been authorized to purchase from J. F. Donahoo, Washington, D. C., two grooved embankment rollers for rolling puddled material, at \$300 each, the rollers to be used as a portion of the plant required for the construction of Cold Springs dam, Umatilla irrigation project, Oregon.

Extension of time

The Secretary of the Interior has granted an extension of time to May 31, 1907, to the Deadwood Construction Company, of Deadwood, South Dakota, for the completion of their contract for structures, Division 4, main canal, Lower Yellowstone irrigation project, Montana-North Dakota. According to the terms of the contract this work was to be completed on December 1, but owing to the occurrence of excessive rains, difficulty in securing labor, and additional work required under the specifications, it became necessary to extend the time of completion.

An extension of time has also been granted to W. O. Morrison, of Den-

ver, Colorado, for the completion of his contract on structures, Interstate canal, North Platte irrigation project, Nebraska. According to the terms of the contract the work was to be completed by December 1, 1906. Owing to the difficulty in securing material and labor the work has been delayed. The engineers also report that the actual amount of work involved exceeds by about 30 per cent the amount estimated at the time the contract was awarded.

The Secretary of the Interior has therefore extended the time on the work, as follows:

Seventy per cent of the amount covered by the original contract to be completed by December 1, 1906;

One hundred per cent of the work covered by the original proposal, which covers the completion of all structures which would in any way interfere with the flow of water in the canal, by April 1;

The entire work, covering the completion of other structures, such as bridges, overflows, etc., by July 1, 1907.

An extension of time to June 1, 1907, is given W. D. Lovell, of Minneapolis, for the completion of his contract for structures under the Huntley irrigation project, Montana. Since the date of making this contract the amount of work required has been greatly increased, and the equivalent of the work called for in the contract was completed within the specified time.

Three months' extension of time has been granted to the United Iron Works, of Oakland, California, for the completion of their contract for furnishing gates and lifting devices for use in connection with the Payette-Boise irrigation project, Idaho. This extension is allowed by reason of the fact that the manufacturers were not furnished with the details and designs in time to comply with the original agreement.

The Secretary of the Interior has granted an extension of time for 45 days from October 15, to Orman &

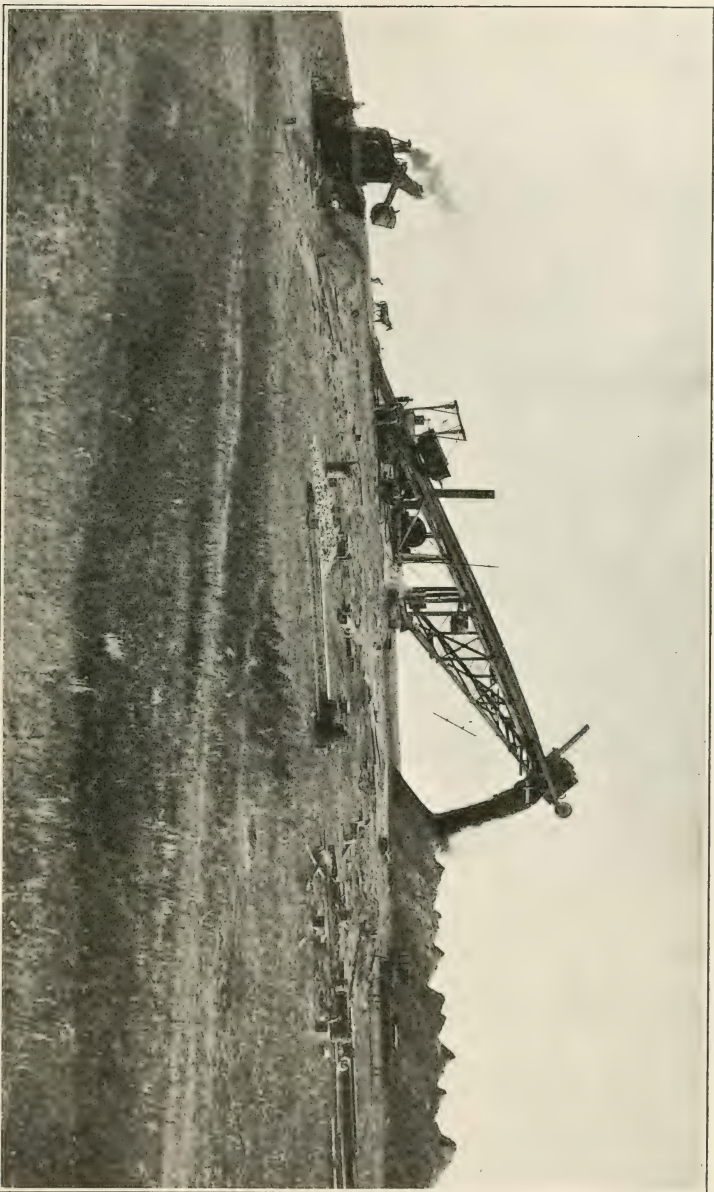
Crook for the completion of the work under their contract for the construction of dam and canals, Belle Fourche irrigation project, South Dakota. The scarcity of labor is responsible for the delay in the work, and the engineers report that the extension of time will not interfere with their plans.

The D'Olier Engineering Company, of Philadelphia, has been granted an extension of time until March 15, 1907, for furnishing an electric power plant for the Garden City irrigation project, Kansas. According to the terms of the contract the power plant was to be installed by January 20, but owing to some delay in the design work has not yet begun on the power house, and the project engineers recommended the extension.

Contracts and Bids

The Secretary of the Interior has executed a contract with Thomas Jaques, of Pilot Rock, Oregon, for the construction and completion of about fifteen miles of main canal and lateral ditches, Umatilla irrigation project, Oregon. The work involves about 165,000 cubic yards of excavation, and, according to the terms of the contract, must be completed by May 1, 1907. The amount of Mr. Jaques' bid was \$20,212.50.

The Secretary of the Interior is also advertising for proposals for furnishing high pressure gates for the storage of water for the Shoshone and North Platte irrigation projects, Wyoming. The work consists of furnishing and installing complete in the excavations furnished by the United States, at the Shoshone dam near Cody, and the Pathfinder dam near Casper, seven gates of the sluicing type arranged at the Shoshone dam in a group of three, and at the Pathfinder dam in a group of four. The bids will be opened on December 20, at 876 Federal Building, Chicago. Particulars may be obtained at the office of the Chief Engineer, Reclamation Service, Washington, D. C., or from H. N. Savage, Supervising Engineer, Huntley, Montana.



Steam Shovel and Derrick Cars in operation on Belle Fourche Project, South Dakota

A contract has been made with the Billings Construction Company, of Billings, Montana, for the construction of the Corbett dam and auxiliary structures under the Shoshone irrigation project, Wyoming. The Corbett dam is a reinforced concrete structure located on Shoshone River about 8 miles northeast of Cody, Wyoming, and the contract involves about 10,000 cubic yards of excavation, 8,000 cubic yards of concrete, 9,000 cubic yards of earth and gravel embankment, and the placing of 250,000 pounds of steel reinforcement. The bid of the contracting company was \$66,750, and, according to the terms of the contract, the work must be completed on or before April 1, 1907.

Proposals are being asked for the construction of structures on the main canal and laterals from the headworks to the town of Newlon, Lower Yellowstone irrigation project, North Dakota and Montana. The work involves approximately 10,000 cubic yards of excavation, 1,400 cubic yards of concrete, 2,200 cubic yards of rip rap, 90,000 pounds of square steel bars, and 300,000 feet board measure of lumber. The bids will be opened at Glendive, Montana, December 15.

The Secretary of the Interior has executed a contract with the Pacific Portland Cement Company, Consolidated, of San Francisco, California, for furnishing 27,000 barrels, more or less, of Portland cement for the Sunnyside and Tieton irrigation projects, Washington. The cement is to be furnished at \$2 per barrel, f. o. b. cars at the company's mills, Tolenas, California.

A report has been received by the Chief Engineer of the Reclamation Service from the board of consulting engineers recently convened at Mitchell, Nebraska, to open proposals for the construction of a diversion dam and headworks, North Platte irrigation project, Nebraska-Wyoming.

No bids were received on Schedule 1, consisting of the earth embankment, and but one bid on Schedule 2, the concrete structures. Mr. G. F. At-

kinson, of Colorado Springs, Colorado, was the contractor who submitted a proposal for the work of Schedule 2, and the aggregate of the several items was \$142,720.

The Reclamation Service is advertising for proposals for the construction of laterals and waste ditches near Glendive, Montana, in connection with the Lower Yellowstone irrigation project, Montana and North Dakota.

The work consists of about 74 miles of lateral ditches and about 34 miles of waste ditches, involving the excavation of approximately 800,000 cubic yards of earth, and furnishing such material and doing such other work as may be necessary for the completion of the work.

The bids will be opened at Glendive, Montana, on December 15.

The Secretary of the Interior has executed a contract with Pickering & Rush, of Morrill, Nebraska, for the construction and completion of Schedule 13 of earthwork of distributing system, Interstate canal, North Platte irrigation project, Wyoming-Nebraska. Schedule 13 consists of about 8 miles of material and 1,000 cubic yards of overhaul. The bid of the contracting party was \$6,052.50.

Work by Force Account The Secretary of the Interior has authorized the Reclamation Service to construct under force account or by small contracts to be entered into by the engineer, 13.3 miles of canal on the Okanogan irrigation project, Washington. This work consists of an extension of the main canal for a distance of 5.6 miles, and of the lower main canal for a distance of 7.7 miles. The region is remote from railroad transportation and it is difficult to secure satisfactory bids. It is, therefore, believed to be to the best interests of the government to carry on the work as above outlined.

The Secretary of the Interior recently advertised for bids for the construction of a diversion dam and headworks, North Platte irrigation project, Nebraska-Wyoming, to be opened No-

vember 1. The only bid received was one on Schedule 2, by G. F. Atkinson, Colorado Springs, Colorado.

The Secretary of the Interior has rejected this bid as excessive, and has authorized the prosecution of work at the headgates by force account. It is necessary to advance this portion of the work as rapidly as possible in order that water may be delivered in the spring of 1907. The remainder of the work will be readvertised.

Land Withdrawals

The Secretary of the Interior has temporarily withdrawn from settlement, entry, or other form of withdrawal under the public land laws, except Homestead Law, the following described tracts for use in connection

with the Grand River irrigation project, North Dakota:

Fifth Principal Meridian, N. Dak.

T. 129 N., R. 98 W., Secs. 27, 28, 31, 32, 33, 34, 35 and 36.

T. 129 N., R. 99 W., Secs. 26, 29, 30, 31, 32, 33, 34, 35 and 36.

T. 129 N., R. 100 W., Secs. 19, 20, 21, 25, 26, 27, 28, 29, 30, 32, 33, 34, 35 and 36.

Black Hills Meridian, S. Dak.

All fractional townships 23 N., R. 8, 9 and 10 E.

The following public lands under this project are withdrawn from any form of disposition whatever under the public land laws:

Fifth Principal Meridian, N. Dak.

T. 129 N., R. 101 W., Secs. 10, 11, 13, 14, 15, 23, 24, 25, 26, 27, 34 and 35.

ORGANIZATION WORK

What Members of the American Forestry Association Can Do to Help the Organization

THE question frequently comes to the Secretary of the American Forestry Association, "What can I do if I join the Association?"

There are several things a member can do. Let us note one or two.

Make of yourself a center of influence for the saving and extension of the forests. How powerful and far-reaching one's influence may be must depend, in part, upon himself and, in part, upon his circumstances; but all have some influence. Moody, in illustrating his talk with the tobacconist's sign, used to say, "Even a wooden Indian has some influence." Preach the gospel of forestry. Scatter the light. Urge the importance of action. Show that, to be effective, this action must be concerted, organized. Urge your friends, therefore, to become members of the American Forestry Association, to supply its treasury, and to cooperate with it in pushing the great work to which it is committed.

But you are "not well informed," you say, as to the facts, and hence

cannot so present your argument that it will carry conviction. Very well. Why not enlarge your knowledge? The literature of forestry is extensive. Provide yourself with, at least, a few representative books, and study them.

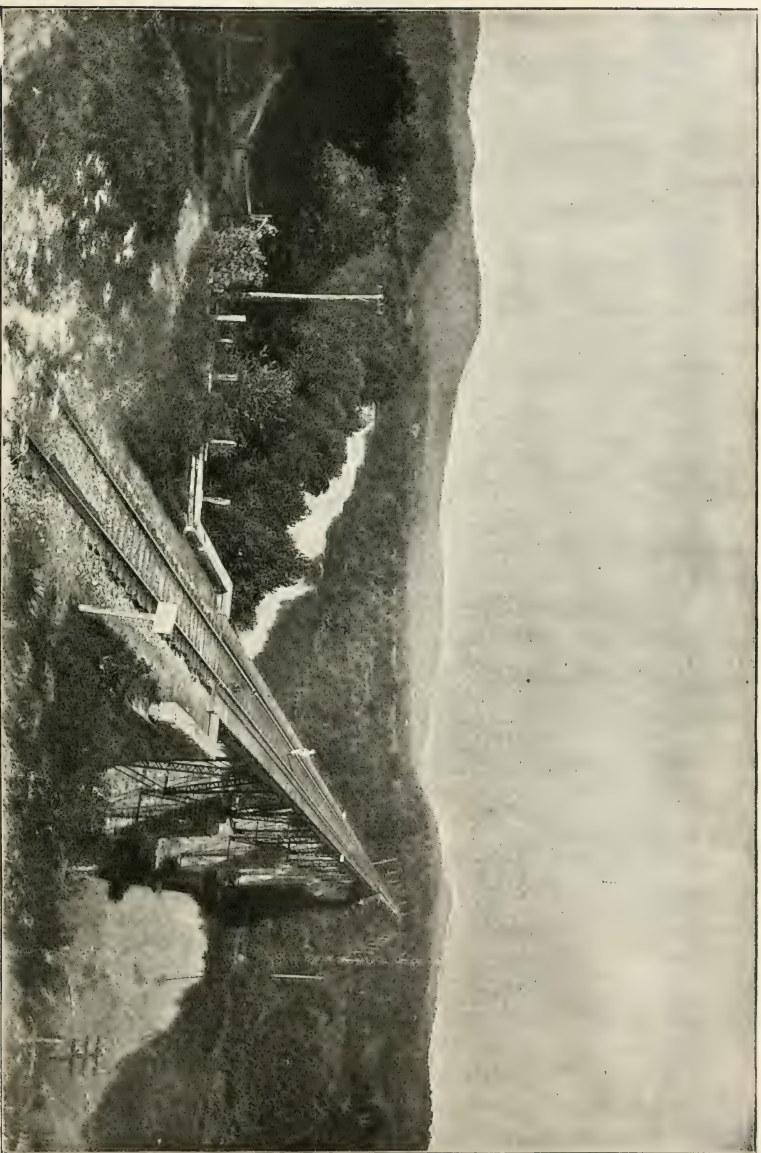
What books? Let us name one in particular: The "Proceedings of the American Forest Congress."

This congress, the most notable and representative, perhaps, ever assembled in America in the interest of forestry, met in Washington January 2-6, 1905.

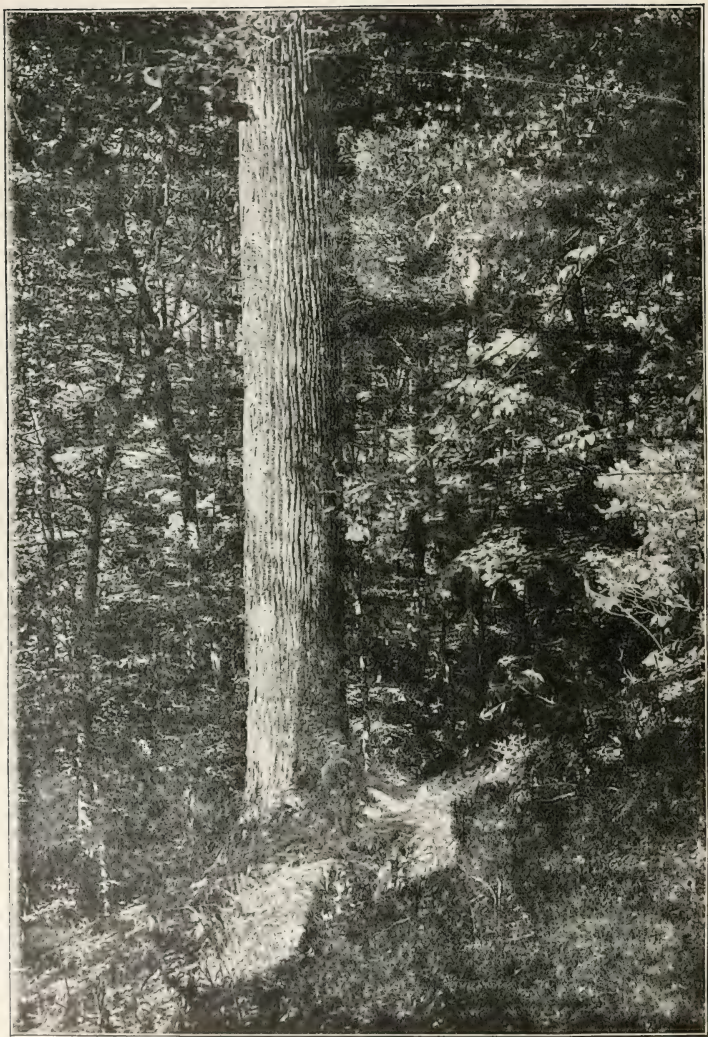
The speakers included many of the chief forestry authorities and workers in the United States, and some from other countries, together with prominent representatives of the great wood-using industries. Out of sixty of these may be mentioned, as types, President Roosevelt, Secretary Wilson, J. J. Jusserand, French Ambassador; Gifford Pinchot, the U. S. forester; B. L. Wiggins, vice-chancellor, University of the South; F. H. Newell, chief engineer, U. S. Reclamation Service; N. W. McLeod, president, Na-



Forests on the Southern slopes of the Blue Ridge, about Mount Toxaway, in the Sapphire Country, Western North Carolina



The Southern end of the Appalachian Mountains, near Cartersville, Georgia



Large Poplar Tree growing in mounta'n ravine on west slope of the Great Smoky
Mountain, Eastern Tennessee

tional Lumber Manufacturers' Association; J. E. Defebaugh, editor *American Lumbermen*; Col. Geo. H. Emerson, vice-president, Northwestern Lumber Company, and Gen. Chas. F. Manderson, general solicitor Chicago, Burlington and Quincy Railroad Company.

This book has been called "The most comprehensive and authoritative publication on the subject of forestry that has yet been issued in the United States." For the general reader who wants to know what the forestry question is and what to do about it, there is no book which, on the whole, we deem so useful as this.

The book is printed on good paper, in clear type; it is well bound in cloth, and contains 474 pages; it sells at \$1 per copy.

To members of the American Forestry Association this volume is now offered at 50 cents per copy, post-paid, with the hope that it may be largely ordered and widely used for propaganda. A copy will make an excellent Christmas present.

Again, to make converts, you must have literature for general distribution. "The Need for the Forestry Movement," is a neat, four-page folder containing a compilation of telling facts and testimonials, published by the American Forestry Association to-

gether with a list of its officers. Every member of the Association should carry a supply of these in his pocket, hand them to friends whom he would interest, and enclose them in his letters. They can be had from the national office of the Association at 50 cents per hundred, post-paid.

Here is an opportunity for the forestry worker. Stock up with books and folders, and set to work. Some who may not care personally to hand out circulars are in position to mail them from their offices to friends whom they would influence. You belong, perhaps, to some society or association whose members should be reached. Send them the folders; or send their names to the national office of the Association, with remittance to pay for folders. It will then mail them out.

The national office is working to the limit; but others, too, must work if the forests are to be saved. The Association has now approximately five thousand members. If each of these will do what he can there will be rolled up a tidal wave of public sentiment whose potency no man can estimate. Let each do his part.

THOMAS ELMER WILL,

Secretary, American Forestry Association.

THE LA PLATA PROJECT

Consulting Engineers Recommend Temporary

Abandonment Owing to the Excessive Cost

A BOARD of consulting engineers which recently made a thorough field examination of the lands under the La Plata irrigation project has submitted a report to the chief engineer of the Reclamation Service in Washington. The La Plata project is located along the northern side of the San Juan River in northwestern New Mexico, the greater portion of the land

lying along the La Plata River, a tributary of the San Juan.

Farmers in this valley formerly received an adequate water supply from the La Plata River, but recent appropriations in Colorado divert all of the normal flow before it reaches New Mexico. The normal flow has been greatly decreased in late years by the deforestation of the mountain slopes

of the drainage basin, so that the river in this section is now practically dry after the spring run off, except during passing storms. As a result orchards are dying and many farms have been deserted, and the settlers who remain are receiving a very inadequate water supply.

When the attention of the Reclamation Service engineers was called to the situation in 1904, it was thought possibly the water supply might be regulated by storage reservoirs, or supplemented by a diversion from Las Animas River, which lies just to the east of the La Plata drainage basin.

A feasible reservoir site was located on the La Plata River at the state line. An investigation of the Las Animas valley disclosed a good reservoir site just above the town of Durango, but the site is traversed by a railroad, and the heavy cost of moving this railroad would fall upon the irrigators. The diverting canal would have to be carried through town lots and over valuable mining property, making the right

of way through Durango alone an expensive one. Then the dividing ridge between the two drainage basins presents another obstacle, and a tunnel three miles long through the mountains would add further to the expense.

The soil in the La Plata valley proper and on the various mesas which could be irrigated is unusually well adapted to the successful growing of all kinds of grains, grasses, vegetables, deciduous fruits, and melons. The yield in all cases when sufficient water is properly applied is large, and the products of fine grade, but the engineers have found the cost to be in excess of anything that the limited area with its present lack of transportation facilities could bear.

In view of the limited fund available and the many more attractive schemes which are being presented for consideration, the engineers have recommended that this project be abandoned for the present at least.

FORESTRY AT FORT RILEY

The Commandant Recommends Forest Work as a Help for Maneuver Grounds

IN the Annual Report of the Commandant of the School of Application for Cavalry and Field Artillery at Fort Riley, Kans., for 1906, the following reference to forest work is made:

"As the greater part of this reservation of nearly twenty thousand acres is open, treeless country, intersected by numerous ravines bordered by rim rock, the opposing forces, during maneuvers, come in view of each other at long distances and thus come in contact much sooner than would be the case in actual hostilities. Moreover, a force exposing itself but a short time to the fire of modern artillery, is presumed to suffer great loss. The awarding of many casualties at maneuvers interferes with the exercise and, there-

fore, in order to increase the tactical value of the terrain, it is desirable to screen the operations as much as practicable. This can only be done, on this reservation, by forestry.

"On December 8th, last, a request was made to the War Department for the assistance of the Bureau of Forestry of the Department of Agriculture for advice and assistance in making comprehensive plans to carry on this work. The latter department cordially co-operated, and this spring sent Mr. Charles A. Scott, assistant forester, to the post. Mr. Scott examined the reservation and made a report with map and plans and added practical suggestions as to the work. Unfortunately, this report did not reach me until June—too late to procure the

necessary tools and implements and prepare the soil. As much as is practicable at present is, however, being done, pursuing the general plan furnished, following along the numerous ridges, plowing a belt a short distance from the military crest, with the intention of planting from three to five rows of trees in each belt. The total length of these belts, when completed, will be between twelve and fifteen miles and the belts will contain about fifteen thousand broad-leaved trees and about five thousand pine trees. The latter will

be furnished by the Bureau of Forestry, and the former will have to be purchased from nurserymen in this state and in Nebraska. . . . It is also proposed to plant many thousand acorns, blackberries, pignuts, etc., on the slopes of the ravines below the rim rock. This plan pursued systematically and intelligently for several years, will greatly increase the military value of the reservation and, incidentally, this plan will also beautify the reservation and, in time, bring some return in fuel."

STRENGTH AND STIFFNESS OF WOOD

How It Is Affected by Moisture—Experiments by Forest Service

VERY little is definitely known about the influence of moisture on the strength of wood, even by those experienced in handling the material. Since the whole subject is one of great importance, the Forest Service has been making a thorough study of it during the past three years and is about to publish the results of its investigation in an exhaustive technical bulletin entitled "Effect of Moisture Upon the Strength and Stiffness of Wood."

The chief points presented by the study are:

1. The relation of moisture to strength follows a definite law which can be graphically expressed. Proper drying very greatly increases the strength of all kinds of wood, the amount of increase in strength depending upon the species and the dryness. The increased strength given to green wood by thoroughly drying it is so great that it will surprise many. For example, the strength of a piece of unseasoned red spruce may be increased over 400 per cent by a thorough drying at the temperature of boiling water. Strength decreases again, however, as the wood reabsorbs moisture. Air-dried wood, protected from the weather, and containing 12 per cent of moisture, is from 1.7 to 2.4

times stronger than when green, varying with the species. Stiffness is also increased by drying. These conclusions, however, are drawn from small-sized pieces not exceeding 4 by 4 inches in cross section such as are used in vehicle work, tools, etc. Large timbers require years of drying before the moisture is reduced to the point where strength begins to increase. It must also be taken into consideration that more or less checking always occurs when large timbers dry; and if this checking is excessive it may cause weakness to counterbalance, partially or entirely, the strength gained in drying. Consequently, it is not safe to assume that the average strength of large, so-called seasoned timbers is much greater than that of green or wet ones.

2. The fiber saturation point of a number of species has been determined. This point, which varies with conditions and species of wood, designates the percentage of water which will saturate the fibers of the wood. It has been found that, under normal conditions, wood fiber will absorb a definite amount of moisture; beyond this the water simply fills the pores of the wood like honey in honeycomb. Only that water which permeates the wood fiber has an influence upon the

strength. For the following species, the saturation point occurs at the given percentage of moisture based on the dry weight of the wood:

Per cent moisture.

Longleaf pine.....	25
Red spruce.....	31
Chestnut	25
Loblolly pine sapwood...	24
Red gum.....	25
Red fir.....	23
White ash.....	20.5
Norway pine.....	30
Western tamarack.....	30

3. Prolonged soaking in cold water does not reduce the strength of green wood below that of its fiber saturation point, provided it remains in perfect condition. When wood has been dried and is re-soaked it becomes slightly weaker than when green.

4. Wood soaked in heated water absorbs more moisture because the amount of water which the fiber will contain is increased. This causes a reduction in strength and stiffness, as in wood that is heated or steamed for bending.

THE FORESTRY EDUCATION BILL

Measure of Wide Importance Now Before
Congress—Should Be Passed At This Session

BY

SAMUEL B. GREEN

Professor of Forestry, University of Minnesota

PERHAPS the most important piece of new forestry legislation on which Congress will be asked to pass at its next session is the bill (H. R. 10,100) introduced by Congressman Davis of Minnesota, which provides funds for the support of a chair of forestry in each of the agricultural colleges and for experimental forestry work in each of the experiment stations of all the states and territories. This bill was introduced in the last session and has not attracted the attention that is due to it. There can be no question but what the best way of educating the people to the importance of forestry and forestry matters is through some measure of this kind that will make a center of intelligent forestry ideas in every state. If one will note the great advance in agricultural science, due to appropriations for a similar purpose and expended in a similar way, I think he can get an idea of the possibilities of such legislation for the encouragement of forestry.

The subject of forestry has attracted much attention during the last few years, and the help of President Roosevelt has been of the greatest assistance to the movement, as his words in regard to it have been quoted widely. As a result of this a large number of bright young men are looking for opportunities in this line and it would seem as if for the welfare of the whole country, as well as of the several states it is important that they be furnished with the training they so much desire.

The bill in question is so drawn as to require the appropriation it carries to be used entirely for work in forestry. There is not a state or territory in the Union but what is greatly in need of the assistance that would be rendered by the passage of this bill. It is to be hoped that the friends of forestry will rally to the support of this measure and push it through Congress the coming winter.

Forestry and Irrigation

H. M. SUTER, Editor

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Grandfather Mountain, the highest point on the Blue Ridge and located in the heart of the proposed Southern Appalachian Forest Reserve

FORESTRY AND IRRIGATION

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No. 12

ANNUAL MEETING OF THE AMERICAN FORESTRY ASSOCIATION

THE Annual Meeting of the American Forestry Association will be held at Washington, D. C., on January 8 and 9, 1907. On Tuesday evening, January 8, a reception will be held at the residence of Mr. Gifford Pinchot, the Forester, and on Wednesday, January 9, at 10 a. m., the public meetings will begin at the New Willard Hotel.

On arriving in Washington, members are requested to register at room 108, Atlantic Building, 928-30 F street, northwest—the offices of the Forest Service. Programs and invitations to the reception will be issued at the time and place of registration.

Further information will be found in the following letter to members sent out by the Secretary.

To the Members of the American Forestry Association:

In its entire history, no period has equaled, in prosperity and usefulness for the Association, the twelve months ending November 30, last.

There have been added 2,503 annual members, 47 sustaining and 63 life, a total of 2,613.

As shown by the Treasurer's books, there were, on the date named, 5,378 members on the rolls of the Association.

But at no date in the history of America have conditions so demanded such an association as to-day. The need for forest preservation and extension, long existing, has become imperative. Extravagant consumption, reckless waste, and failure to provide for continuing of our forests require our most active efforts if a crisis is to be averted.

With this situation the Association should resolutely grapple; so serious, however, is the problem, and so great are the difficulties that, to do so effectively, its organization must be improved and its membership and funds substantially increased.

A momentous task now confronts this organization; it is the enactment into law of the Appalachian-White Mountain bill.

This measure has unanimously passed the Senate of the United States; it has been recommended by the House Committee on Agriculture without a dissenting vote; it has been approved in advance by the President, and a majority of the House are understood to favor it; yet it may not be permitted to come to a vote.

The American Forestry Association is absolutely committed to this meas-

ure. From now until March 4, next, each member should feel it his imperative, personal duty to exert his utmost effort to insure its passage.

On January 8 and 9, next, occurs the annual meeting of the Association; a broadly educational program is in preparation; it bears especially upon the policy of national forests, and the prime object of the meeting will be to push the Appalachian-White Mountain bill. Every member should, if possible, attend; he should come prepared to remain, if necessary, till the following week, and to work as he never worked before to write this bill upon the Federal statutes.

That the Association may rise to

the situation before it, each member is urged to

1. Continue his membership by promptly forwarding his dues to the Treasurer;
2. Advance his membership, if annual, to the rank of sustaining or life;
3. Enlist at least one new member for the Association.
4. Write his Congressman to push the Appalachian-White Mountain bill, and
5. Come to the annual meeting resolved that *this bill shall pass*.

THOS. E. WILL,

Secretary..

NEWS AND NOTES

Michigan Forests

"Michigan should derive an income of about \$30,000,000 annually from the 6,000,000 acres of unproductive lands within her borders which at present are going to ruin through denudation of her forests. This amount would be more than sufficient to pay all the expenses of the State, and would take a tremendous tax burden from her citizens," said Carl E. Schmidt in addressing the Detroit branch of the Association of Collegiate Alumnae at their last monthly meeting.

Mr. Schmidt, Prof. Filibert Roth, Professor of Forestry at Ann Arbor, and State Forestry Warden, and Miss M. Baldwin, of Birmingham, chairman of the forestry committee of the State Federation of Women's Clubs, addressed the alumnae on the subject of forestry.

Miss Baldwin stated that as a result of the work of the committee, 184 women's clubs in Michigan have received literature bearing on the forestry question, and each has given from two to three meetings to its consideration.

Miss Baldwin said: "We women

must see to it that no member of the legislature goes to Lansing this year without a knowledge that the women of the State want a reform in our land laws. Our committee has endeavored to reach every candidate before election and we have tried to pledge them to forestry reform. The candidates from Wayne county have not been interviewed, and I urge you to see them after election and get pledges from them in this matter. See your township road commissioners also, and get them to plant trees, as the law provides, along the public roads." The alumnae agreed to work to this end.

Prof. Roth's Opinions

Prof. Filibert Roth, after saying that the women of Michigan have created the sentiment that lies back of the forestry movement, said: "President Roosevelt has stated that forestry reform is the most important general problem in the United States at the present time. Michigan has 2,000,000 persons dependent on the forests for their living. She will have 5,000,000 before the century ends. She uses annually one thousand millions of feet

of lumber, exclusive of railway ties, poles and the like. In New England, with soil similar to much of ours, of all land cleared up to 1880 40 per cent had been abandoned to the forest before 1900. For the same reason this thing is going on in Michigan. Farmers have found by experiment that timber is the only profitable crop that can be grown there.

"There are nearly 4,000,000 acres of unimproved land in the settled portion of lower Michigan. Of the northern peninsula only 5 per cent is cultivated. Twenty million acres of the state are woods or waste lands. When it is realized that lumber is being brought into the state now from the Pacific coast at a cost for freight per car of \$250, and that supplies are also brought from the South, the importance of utilizing the waste land is evident.

"When farmers sell a farm in Michigan they throw in the wood lot—the most valuable part of the farm. The state has not properly protected lumbermen in either life or property in the forests. I see no way to stop their slaughter of the forests they own, but the state can do much on its own lands.

"Michigan now owns outright from 600,000 to 1,000,000 acres of waste land. It is practically owner of all delinquent tax lands, which constitute about one-quarter of the state area. Most of the delinquent tax lands, under the wretched system now in force, are sold from five to six times in a quarter-century. The wood is cut off, the taxes lapse again, and the state is the poorer by the process.

"In the ten years ended in 1905 the state spent \$1,500,000 trying to get rid of these waste lands, as the auditor general's report shows. In one year the state paid out \$65,000 for useless advertisements. Land may now be bought for ten cents an acre. Divided ten lots to the acre it is sold to city buyers, who, when they find out its character, let their rights lapse. These lots must then be advertised year after year. Each advertisement costs the state forty cents. Clerk hire for looking after each lot costs eighty cents.

In other words, the state pays out year after year, in many cases, \$1.20 for looking after what is from one to eleven cents worth of land. Such is the working of the present land law.

"A state forest reserve of ten million acres could be formed with advantage to every citizen. It would in time give employment to hundreds of small saw mills. Had this been done twenty-five years ago we would now be getting a handsome revenue from what is now useless and a great expense. The state forest of Ontario is now paying all the Province's expenses. Inside of fifteen years a forest reserve can be made self-supporting. Inside of twenty-five years it is profitable.

"The state land laws should at once be amended to prevent the sale of any state lands at less than a designated price per acre. At present they may be sold by state officials at any price. The state should be required to make a survey of the material on the land before this price is fixed. At present the state never knows what it sells. Reform of the state land laws is imperatively necessary. Let us work for corrective legislation at the state capitol this winter."

Trouble with Poles

A. B. Gahan, assistant state entomologist of Maryland, was recently called to Annapolis to investigate insect damage to chestnut telephone poles, set 5 to 7 years. At the point of contact with the ground the honeycombing of the outer portion by worms, followed or preceded by rot, had rendered the pole unsafe for further service. The worm is bluish-white in color and from an inch to an inch and a quarter long, and the borings are about one-sixteenth of an inch in diameter. The poles had been treated.

In Northern North Dakota

Organization of the educational work at Bottineau, N. Dak., has recently been effected, under the law passed a few years ago providing for a state school of forestry (pp. 242, 243, "Federal and State Forest Laws.")

Prof. R. R. Thompson, who is in charge of the school, writes that very much in the way of experimentation must be done, so that a forest seed bed and nursery will be instituted at once. The state experimental station is located in Cass county, near the Minnesota line and much farther south, so that the results of investigations there can not be safely applied to the more rigorous climate farther west on the Canadian line.

New Forestry Instructor

Mr. F. H. Sanford has been appointed instructor in forestry at the Michigan Agricultural College. He graduated from the forestry course at the same institution with the class of 1904, since which time he has been conducting a forest nursery in connection with other business.

Experiments in Forestry

A correspondent of the *Paper Mill* tells of an interesting experiment in reforestation being made at the Sturgeon River farm of S. W. Bridges, in Houghton county, Michigan, which gives promise of excellent results. The pride of the farm, which comprises 1,280 acres, is a grove of about 600 second growth pine, which Mr. Bridges has trimmed up and the underbrush removed from among them. The trees have grown nearly two inches in diameter and thirty inches in height during the past year. It is Mr. Bridges's intention to trim up 1,000 more young pines this year. He is so well satisfied with present results that he thinks there will be money made in cultivating second growth pine.

Michigan Forest Fires

According to the annual report of State Fire Warden H. H. Ryerse, of Allenville, Mackinac county, forest fires in Michigan during the past season destroyed timber and other property of estimated value of \$460,482. There were 368 separate and distinct fires of which report was made to him, and of these 48 occurred in Marquette county, the greatest number in any county in the state. Mackinac had 32;

Emmet, 31; Menominee, 26; Ontonagon, 24; Schoolcraft, 22, and Cheboygan, 10. There was expended by the department in fighting fires the sum of \$2,330, and in addition \$687 was expended in posting notices. The greatest havoc was done in Luce county, where there were nine forest fires which caused a total loss of \$101,380. The value of the property destroyed in Presque Isle county, where twelve fires occurred, was \$75,575; in Menominee, \$69,700; in Delta, with fifteen fires, \$59,640; in Dickinson, with four fires, \$50,000; in Marquette, \$42,075; in Mackinac, \$19,265; Emmet, \$12,275, and in Ontonagon, \$10,995. The remainder of the loss—\$19,477—was sustained in Antrim, Alger, Alcona, Alpena, Baraga, Benzie, Charlevoix, Cheboygan, Chippewa, Gogebic, Iosco, Iron, Kalkaska, Keweenaw, Leelanaw, Manistee, Missaukee, Montmorency, Oscoda, Ogemaw, Roscommon, Otsego, and Wexford counties. According to the *Paper Mill*, a scrutiny of the estimated losses leads to the conclusion that the returns made to the State Warden have been very conservative. The value of the property wiped out in Chippewa county is given at \$2,805, when in the Troup Lake district alone forest fires raged for several weeks, and on more than one occasion threatened small towns and settlements. No losses are recorded for Houghton county, which had a number of bad fires during the summer, and the damage in Iron county, given at \$1,525, appears much too low. The same may be said of the destruction in Alger, recorded at only \$330, when a considerably greater loss is said to have been occasioned by one fire alone, this in the vicinity of Grand Marais. The estimate for Gogebic—\$300—likewise appears very conservative, and the loss of but \$1,410 in Schoolcraft is certainly not too high.

Stream Pollution

A discussion of stream pollution by acid-iron wastes, based on investigations made at Shelby, Ohio, has recently been published by the United



A Western Valley that will make a Prosperous Community when Irrigated.

States Geological Survey as Water Supply and Irrigation Paper No. 186. The author, Mr. Herman Stabler, gives the history of the pollution and the attendant litigation, explains the effect of acid-iron liquors upon sewerage purification processes, describes the conditions along the streams, and discusses methods of disposing of acid-iron wastes without discharge into watercourse or sewerage system. The investigations conducted by Mr. Stabler were made under a co-operative agreement between the United States Geological Survey and the State Board of Health of Ohio, each bureau participating equally in the expenses involved.

Stream pollution by ironworks effluents has always been an important question in countries where the iron industries are prominent. The polluting liquors, commonly known as "acid-iron" liquors, are derived from the "pickling process" common to galvanizing, tin plating, tube and sheet iron treatment. This "waste pickle" is not a desirable addition to streams (1) because it produces a reddish discoloration and turbidity, making the stream waters, bed, and banks unsightly; (2) because, by reason of its avidity for oxygen, it robs the waters of their natural supply of this essential gas and thereby, when it is present in comparatively large quantities, causes the death of fish, and (3) because it gives rise to a large quantity of iron in the stream, and thereby impairs the usefulness of the water for domestic and laundry purposes and for certain manufacturing processes.

Washington Irrigation Notes

Members of the Sunnyside Water Users Association met at Prosser, Wash., west of Spokane, recently for the purpose of inducing holders of water contracts with the Washington Irrigation Company to sign contracts with the Government, which will extend the Sunnyside canal. The maintenance fee will be reduced to 60 cents per acre, as against \$1.50 charged by the Washington Irrigation Company.

The proposition was well received and most of the members joined in the federal plan.

Work has been begun on the Government irrigation scheme in Okanogan county, west of Spokane. The direct benefit of the project will be for Alma, Riverside, and all river towns. Conconully will be the supply end of the system, furnishing the water, the reservoir, and the altitude to give flow and power.

Jay Lynch, agent of the Yakima Indian reservation, west of Spokane, has received advices from Washington, D. C., that the Indian Department has appropriated \$15,000 to extend the irrigation work on the reserve. This means that 20,000 additional acres of the richest and in the Yakima Valley will be put under cultivation.

J. E. Tupper, surveyor of Garfield county, south of Spokane, says the federal appropriation will be asked to make a survey and determine the feasibility of diverting water from the upper Tucannon near the mouth of Cummin's Creek for irrigation.

It is planned to construct several large reservoirs in the mountains by which an immense quantity of water can be stored during the freshest season. Mr. Tupper believes the water can be conducted to the reservoirs at a reasonable cost. From these reservoirs water could be distributed over the Dutch and Dataha flats, irrigating some of the best lands in the state.

The general land office has just given out a statement that nearly \$500,000 was contributed by the State of Washington to the reclamation fund last year. The receipts from all sources were \$4,822,084, much larger than the estimate made less than a year ago by the Secretary of the Interior, when that official was trying to determine the probable extent of the reclamation fund between then and 1908.

Forestry Building Improved

A substantial foundation has been placed under the Forestry building at the Lewis and Clark Exposition grounds, Portland. J. J. Hill showed

his interest in forestry by contributing \$10,000 to cover the cost. The building is of great interest to tourists, and attracts as many as 500 visitors a day.

Montana Code

F. H. Ray, assistant state bank examiner and member of the irrigation code commission of Montana, recently announced the details of a code submitted to Gov. John K. Toole to be sent to the incoming legislature. These points are emphasized:

The just and early adjudication of the many conflicting, uncertain water rights now recorded, and this at the least possible cost; the full and prompt protection of water right users without costly litigation; to afford the persons of companies now owning or

hereafter acquiring a water right clear and indisputable title to the same; to make of beneficial use the basis, measure and limits of rights; to prevent waste; to have all records relating to water rights tabulated by stream systems to the public at the State Engineer's office, so that the title may be easily ascertain.

Georgia School of Forestry

A Department of Forestry was inaugurated at the University of Georgia on November 21. At the invitation of Chancellor Barrow, of the University, Mr. Alfred Gaskill, of the Forestry Service, delivered an address on the "Progress of Forestry in the United States." Mr. Alfred Akerman, formerly State Forester of Massachusetts, will be in charge of the courses.

PRESIDENT CALLS FOR IMPROVED LAND LAWS

Ringling Special Message to Congress Shows Flagrant Abuses and Suggests Remedies

PRESIDENT ROOSEVELT, in his special message to Congress, transmitted December 17, puts up to Congress directly the matter of furnishing relief from the workings of the present pernicious land laws. This message is of such wide importance that it is given in full herewith:

To the Senate and House of Representatives:

PUBLIC LAND LAWS.

The developments of the past year emphasize with increasing force the need of vigorous and immediate action to recast the public land laws and adapt them to the actual situation. The timber and stone act has demonstrated conclusively that its effect is to turn over the public timber lands to great corporations. It has done enormous harm, it is no longer needed, and it should be repealed.

The desert land act results so frequently in fraud and so comparatively seldom in making homes on the land that it demands radical amendment. That provision which permits assignment before patent should be repealed, and the entrymen should be required to live for not less than two years at home on the land before patent issues. Otherwise the desert land law will continue to assist speculators and other large holders to get control of land and water on the public domain by indefensible means. The commutation clause of the homestead act, in a majority of cases, defeats the purpose of the homestead act itself, which is to facilitate settlement and create homes. In theory the commutation clause should assist the honest settler and doubtless in some cases it does so. Far more often it supplies the means by which speculators and loan and

mortgage companies secure possession of the land. Actual—not constructive—living at home on the land for three years should be required before commutation, unless it should appear wiser to repeal the commutation clause altogether. These matters are more fully discussed in the report of the public lands commission, to which I again call your attention.

TO PREVENT LAND FRAUDS.

I am gravely concerned at the extremely unsatisfactory condition of the public land laws and at the prevalence of fraud under their present provisions. For much of this fraud the present laws are chiefly responsible. There is but one way by which the fraudulent acquisition of these lands can be definitely stopped, and therefore I have directed the Secretary of the Interior to allow no patent to be issued to public land under any law until by an examination on the ground actual compliance with that law has been found to exist. For this purpose an increase of special agents in the general land office is urgently required. Unless it is given, bona fide would-be settlers will be put to grave inconvenience, or else the fraud will in large part go on. Further, the Secretary of the Interior should be enabled to employ enough mining experts to examine the validity of all mineral land claims, and to undertake the supervision and control of the use of the mineral lands still belonging to the United States. The present coal law limiting the individual entry to 160 acres puts a premium on fraud by making it impossible to develop certain types of coal fields and yet comply with the law. It is a scandal to maintain laws which sound well, but which make fraud the key without which great natural resources must remain closed. The law should give individuals and corporations under proper government regulation and control (the details of which I shall not at present discuss) the right to work bodies of coal land large enough for profitable development. My own belief is that there should be provision

for leasing coal, oil and gas rights under proper restrictions. If the additional force of special agents and mining experts I recommend is provided and well used, the result will be not only to stop the land frauds, but to prevent delays in patenting valid land claims, and to conserve the indispensable fuel resources of the nation.

RIGHTS OF WAY AND PRIVILEGES.

Many of the existing laws affecting rights of way and privileges on public lands and reservations are illogical and unfair. Some work injustice by granting valuable rights in perpetuity without return. Others fail to protect the grantee in his possession of permanent improvements made at large expense. In fairness to the government, to the holders of rights and privileges on the public lands, and to the people whom the latter serve, I urge the revision and re-enactment of these laws in one comprehensive act, providing that the regulations and the charge now in force in many cases may be extended to all, to the end that unregulated or monopolistic control of great natural resources may not be acquired or misused for private ends.

PRIVATE HOLDINGS IN NATIONAL FORESTS.

The boundaries of the national forest reserves unavoidably include certain valuable timber lands not owned by the government. Important among them are the land grants of various railroads. For more than two years negotiations with the land grant railroads have been in progress looking toward an arrangement by which the forest on railroad lands within national forest reserve may be preserved by the removal of the present crop of timber under rules prescribed by the forest service, and its perpetuation may be assured by the transfer of the land to the government without cost. The advantage of such an arrangement to the government lies in the acquisition of lands whose protection is necessary to the general welfare. The advantage to the railroads is found in the propos-

al to allow them to consolidate their holdings of timber within forest reserves by exchange after deeding their lands to the government, and thus to cut within a limited time solid bodies of timber instead of alternate sections, although the amount of timber in each case would be the same. It is possible that legislation will be required to authorize this or a similar arrangement with the railroads and other owners. If so, I recommend that it be enacted.

WORKING CAPITAL FOR NATIONAL FORESTS.

The money value of the national forests now reserved for the use and benefit of the people exceeds considerably the sum of one thousand millions of dollars. The stumpage value of the standing timber approaches seven hundred million dollars, and, together with the range and timber lands, the water for irrigation and power, and the subsidiary reaches an amount equal to that of the national property now under the immediate control of the army and navy together. But this vast domain is withheld from serving the nation as freely and fully as it might by the lack of capital to develop it. The yearly running expenses are sufficiently met by the annual appropriation and the proceeds of the forests. Under the care of the forest service the latter are increasing at the rate of more than half a million dollars a year; the estimates of appropriation for the present year is less than for last year, and it is confidently expected that by 1910 the forest service will be entirely self-supporting. In the meantime there is the most urgent need for trails, fences, cabins for the rangers, bridges, telephone lines and other items of equipment, without which the reserves cannot be handled to advantage, cannot be protected properly and cannot contribute as they should to the general welfare. Expenditures for such permanent improvements are properly chargeable to capital account. The lack of reasonable working equipment weakens the protection of the national forests and greatly limits their produc-

tion. This want cannot be supplied from the appropriation for running expenses. The need is urgent. Accordingly, I recommend that the Secretary of the Treasury be authorized to advance to the Forest Service, upon the security of the standing timber, an amount, say, \$5,000,000, sufficient to provide a reasonable working capital for the national forests, to bear interest and to be repaid in annual installments beginning in ten years.

TRANSFER OF THE NATIONAL PARKS.

The national parks of the West are forested and they lie without exception within or adjacent to national forest reserves. Two years ago the latter were transferred to the care of the Secretary of Agriculture, with the most satisfactory results. The same reasons which led to this transfer make advisable a similar transfer of the national parks, now in charge of the Secretary of the Interior, and I recommend legislation to that end.

INDIAN LANDS.

Within or adjoining national forests are considerable areas of Indian lands of more value under forest than for any other purpose. It would aid greatly in putting these lands to their best use if the power to create national forests by proclamation were extended to cover them. The Indians should be paid the full value of any land thus taken for public purposes from the proceeds of the lands themselves, but such land should revert to the Indians if it is excluded from national forest use before full payment has been made.

GOVERNMENT CONTROL OF GRAZING.

The control of grazing in the national forests is an assured success. The condition of the range is improving rapidly, water is being developed, much feed formerly wasted is now saved and used, range controversies are settled, opposition to the grazing fee is practically at an end, and the stockmen are earnestly supporting the Forest Service and co-operating with it effectively for the improvement of the range.

The situation on the open government range is strikingly different. Its carrying capacity has probably been reduced one-half by over grazing and is still falling. Range controversies in many places are active and bitter, and life and property are often in danger. The interests both of the live stock industry and of the government are needlessly impaired. The present situation is indefensible from any point of view and it should be ended.

I recommend that a bill be enacted which will provide for the government control of the public range through the Department of Agriculture, which alone is equipped for that work. Such a bill should insure to each locality rules for grazing specially adapted to its needs and should authorize the collection of a reasonable grazing fee. Above all, the rights of the settler and

home-maker should be absolutely guaranteed.

Much of the public land can only be used to advantage for grazing when fenced. Much fencing has been done for that reason and also to prevent other stock owners from using land to which they have an equal right under the law. Reasonable fencing which promotes the use of the range and yet interferes neither with settlement nor with other range rights would be thoroughly desirable if it were legal. Yet the law forbids it, and the law must and will be enforced; I will see to it that the illegal fences are removed unless Congress at the present session takes steps to legalize proper fencing by government control of the range.

THEODORE ROOSEVELT.

The White House, December 16, 1906.

NEW NATIONAL FOREST RESERVES*

Plea for Preservation of Important Eastern Regions by Federal Government

BY

DR. THOMAS ELMER WILL

Secretary American Forestry Association

AMONG the bills to be considered by Congress at the present session few, perhaps, if any, are of more far-reaching importance than that providing for national forest reserves in the Southern Appalachian and White Mountains.

That the "Switzerland of America" should be preserved should require no argument. The Southern Appalachian region, greater by far and much less appreciated, will receive chief attention in this paper.

Beginning in Maryland and extending southwestward through portions of Virginia, West Virginia, North Carolina, South Carolina, Georgia, Alabama, and Tennessee, is a narrow strip of mountain land including from four million to seven million acres.

Here lofty mountains, forty-three of them six thousand feet and upward in altitude, gorges with perpendicular sides from five hundred to two thousand feet in height, cascades and waterfalls without number, and vast stretches of noble forest trees of bewildering variety, produce a scene of surpassing magnificence.

Within twenty-four hours' ride of sixty million people we have here, in possibility, a national park and recreation ground more generally useful than any other in the United States.

On the material side, also, this region is of great importance. Of the four great timber areas of the United States two alone remain; the Northwestern and the Southern Appalachian. In the latter is found our last

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remaining important stand of hard woods. The heaviest and most beautiful of such woods on the continent grow here. As stated by Secretary Wilson, "they contain many species of the first commercial value, and furnish important supplies that cannot be obtained from any other region."

Industrial interests of immense magnitude radiate from the Southern Appalachian Mountains. These mountains constitute the watershed of prac-

ton mills, with capital stock of over forty million dollars. A half million of horsepower are already developed and being developed in the entire region concerned, and millions more are available.

This power is, in places, applied directly; in increasing measure, however, it is being transmuted into electricity. Subject, in that form, to transmission for great distances, electricity developed by water power and utilized



Landslide stopped by the Forest in the Southern Appalachians

tically the entire South east of the Mississippi; for almost all important rivers of that section rise here.

The valleys of these rivers include much of the best agricultural land of the South.

Again, the cascades and falls above referred to represent not only beauty but use. As a motive force for driving machinery they are of transcendent value to the South and to the whole country. The Carolinas and Georgia alone employ over one hundred five thousand horsepower in cot-

ton manufacturing promises to work in the South an industrial revolution hardly second to that effected by Whitney's cotton gin.

Upon these forests three foes are concentrating their attack. First is the small farmer, who, crowded from the rich valleys, is endeavoring to hew for himself and his dependents a living out of the mountain side. To do this he clears a space, farms it in rude fashion and, in from five to twenty years, exhausts it; he now moves up the mountain side and repeats the pro-

cess. Erosion follows his operations, and the land becomes a series of worthless gullies.

Next may be mentioned the professional wood-cutters, including tan-bark men, pulp men and lumberers. The first seek only the bark; but, like the hunter of flamingoes' tongues or buffalo hides, they leave behind them to rot, after collecting their tribute, a huge but worthless residue. The pulp man cuts clean, good, bad, large, small, old and young, thus making natural reproduction of the forest impossible. The lumberman takes what he wants, much or little, but by methods that destroy almost as much as he takes, and practically insure fires, which complete the work of denudation.

Having conquered and burnt Carthage, Scipio passed the plow through its site. The corresponding final touch is given to the deforested mountain slopes by the rains. While the forests remain, these regulate the run-off, holding back the water, passing it into the underground circulation, and insuring, throughout the year, a substantially equal stream flow, greatly to the advantage of agriculture, commerce, manufactures and all other interests concerned.

But the forests gone, and the very soil—a vegetable mold—eaten away by the flames, this conservative influence no longer operates. Torrents now rush down the mountain sides, filling streams and harbors, producing overflows, denuding farms of their soils or burying them with sand, destroying water powers and sweeping away railroads, bridges, factories, houses, even villages. In this way, as by the Pacolet disaster, property valued at four and a half million dollars has been destroyed in a single day; while, as in 1901-'02, eighteen millions have been carried away in a year. The continuation of this process means, as in vast areas in the Old World, the rapid transformation of the region affected into a desert.

And the remedy? Experience, European and American, teaches but one. Private initiative, and the individual

struggle for life and profit, necessitate the onward march of the forces of destruction. A reversal of policy is essential. *Laissez faire* must give place to national ownership and administration. On this, all concerned are agreed. The following testimonials are typical:

"If no steps by the Government of the United States are taken the entire tree system of these states will be obliterated, leaving the peaks and valleys of six great States of the Union divested of timber and foliage."—*New York Tribune*.

"It is most sincerely to be hoped that this admirable scheme will be quickly and cordially taken up by Congress and carried to success. It is a case of now or never."—Boston (Mass.) *Transcript*.

"Here are rich forests, capable, under Federal ownership and management, of producing a constant and increasing supply of valuable and necessary timber, fuel, and paper supplies, but which, under private ownership and control, are slowly but surely being converted into centers of widespread disaster."—Governor John McLane, of New Hampshire, before House Committee on Agriculture, April 25, 1906.

"The preservation of the forests, of the streams, and of the agricultural interests here described can be successfully accomplished only by the purchase and creation of a national forest reserve * * * Federal action is obviously necessary, fully justified by reasons of public necessity, and may be expected to have most fortunate results." Secretary of Agriculture Wilson, quoted with approval by President Roosevelt.

The bill now before Congress has the approval of all friends of the forest. It appropriates \$3,000,000 for the purchase of lands from which are to be created two national forest reserves, one in the Southern Appalachians and the other in the White Mountains. One million dollars is to be expended in New Hampshire and two million in the South. The authority to select the land and make the purchases is vested

in the Secretary of Agriculture. The sum named will not complete the necessary work, but it will make a good and indispensable beginning.

This bill has passed the Senate without dissent, and has been favorably reported from committee in the House. Members North and South, regardless

for it. This, in his address at Raleigh, N. C., he showed most clearly; declaring, "Neither State nor nation can afford to turn these mountains over to the unrestrained greed of those who would exploit them at the expense of the future."

Whether or not this bill shall be-



Forest Destruction in the White Mountains

of party affiliations, are for the measure; while for the West, with its vast reserve area, equal to the combined areas of all the States east of Ohio and north of Virginia, to oppose it, would seem peculiarly ungracious. In fact, the majority of the members of the House are understood to favor the bill. President Roosevelt is strongly

come a law depends simply upon whether or not it may come to a vote in the House. The decision of this vital question lies with the Speaker. Thus far, he has opposed the bill.

As the *Boston Transcript* well says, for the Southern Appalachian-White Mountain bill it is "a case of now or never." With the lands in question

the story of the Sybilline books is being repeated. Their values are mounting by leaps and bounds. Again, action already had on the bill is good until March 4, next. After that, with failure in this session, it will be necessary to begin *de novo*. Beginning

then, however, will be like locking the stable door after the horse is stolen, for the woods are falling now like autumn leaves. The time for decisive action is at hand. If we would save these forests we must save them now.

SOME SUGGESTIONS FOR FOREST INVESTIGATIONS

BY

TREADWELL CLEVELAND, JR.

U. S. Forest Service

THE need of action set American forestry going before there was time for thorough investigation of the laws on which American forestry must be based. From the experience of other countries it was seen to be imperative, here, to snatch the brand of our forest wealth from the burning of haste, business, and national shortsightedness, but proof was at first largely wanting, so far as our own conditions were concerned, to show the working of the causes which elsewhere had produced such dire effects. This new country, so large, crowded with so much diversity of life, climate and opportunity, presented problems far more numerous and complex than did any of the smaller nations whose object-lessons we realized it would be very advantageous for us to follow. But we rightly assumed that the natural and economic forces which had brought calamity in Europe and Asia and Africa would make themselves felt in the Western Hemisphere, and we saw that it was good to oppose those forces, to avert that calamity. And ever since we were first convinced of this, and the leaders of American forestry called upon the country to hold up their hands in the new work, we have pressed on with the characteristic national vigor and hurry, insisting on forestry first and content largely to justify it afterwards.

To the alertness, energy and sagacity which enabled us to do this without a firm scientific foundation for much of our work, we owe it that as a nation we have established American forestry where science can now defend it, expand it, and gradually complete it. Had we delayed in order to possess ourselves in advance of every least local detail, American forestry would have taken its place in the realm of the might-have-been. This is the incessant paradox of American civilization—the wisdom of taking a leap in the dark, sure that the leap will land us in the light.

Thus we find ourselves with over half a billion acres of forest lands, of which 127,000,000 acres are now national forests, representing the widest divergence of soil, climate and topography, and the richest variety of forest flora in the world. In place of the single dozen commercial trees of Europe we have at least seven dozen in America, and the same species are found growing in so many different localities and situations that within their natural range they show wide variation in form, size, and rate of growth. Every one of these commercial trees we must learn to know as intimately as the European forester knows his spruce or his larch, his beech or his Scotch pine. We must know not only what kind of wood it

produces but how it grows in the forest, how well it succeeds in holding its own, unaided, in competition with other, less valuable, rival trees. Upon this knowledge depends our choice or control of species in forest management, and the details of the management. Without it, we can make but a sorry showing as technical foresters and can expect only loss in the long run in our account with the forest as business men. No amount of time intelligently given to silvics can be wasted; the very fullest opportunities should be found, or made, to facilitate the investigation and classification of the forest habits and behavior of our commercial species. It is largely by his superior wisdom in this lore that the forester is able to show the way to the lumberman, who in most of the other branches of practical forestry has the clear advantage which comes of experience learned in the school of necessity. It is the lumberman's business to know everything about the business side of the forest. As soon as the forester is prepared to show him the business of silvics, lumberman and forester, as wood growers, will stand evenly abreast.

Without full knowledge of silvics grave mistakes easily occur in forest management. A little misunderstanding as to the comparative reproductivity, growth-rate, tolerance, or root-firmness of two species may too surely result in the supremacy of an inferior tree and heavy financial loss in the eventual yield of a vast tract. A little misjudgment in the selection of a diameter limit, based on false silvical facts, may, by its effects on the after forest, prove far costlier than clean cutting would have been, with all the expense of planting and the longer wait for the new crop duly counted in.

Our silvical knowledge, though growing, is still very incomplete. By whatever means may prove most efficient and economical, every effort should be made to add to it, to give it due weight, and to draw upon it systematically. In the Forest Service silvics has long been eagerly pushed, and

now that the reserves offer such excellent experimental areas, it is hoped that the science will gain added impetus.

Our silvics has been first mentioned because it stands first in importance for the science and practice of forestry considered as the means of controlling the production of wood. Quite as important economically is the problem of forests and water supply. In foreign countries this has been studied exhaustively, and the invaluable function of the forest in impounding and graduating to a useful rate of run-off the rainfall on a given area has been established and reduced to conclusive figures. No competent and impartial person doubts for a moment that this function of the forest is as active and vital in our own country. Without reference to the general physical laws on which it is based—laws which are, of course, broadly the same everywhere and always—it has been abundantly verified by observers in regions where the forest, once normal, has been depleted or destroyed. But here again the newness of the conditions, differences of topography, climate, soil, and soil-cover, confront the American forester virtually with a fresh problem, the details of which in their local significance he must work out for himself. Investigations of rainfall and run-off from well forested and from sparsely covered or denuded slopes, particularly over our western area of scant or unequal precipitation, are much needed as a means of developing to its fullest capacity the acknowledged usefulness of the forest as a water conservator.

Another line of investigation, closely allied to the last, is more purely scientific, less directly practical, but of very high universal economic value. This is the relation of the forests to climate. Though it is generally accepted by European foresters that climate is not appreciably affected by the presence or absence of forests, it may be that this position is supported only within the area limits covered by the foreign investigations. It is perfectly

obvious that any climatic influences which forests may exert must depend upon the extension of the forests over very large areas. A slight acquaintance with the laws of meteorology suffices to show this. In view of the extended area of the United States, is it not within the bounds of possibility that observation and historic researches, supplemented by well-planned investigations, may lead to results in this country which were not to be expected within the narrow boundaries of European states, results showing that for large regions the soil-cover, and consequently the forest most of all among the various sorts of soil-cover, is not without its measurable influence on the total distribution of moisture, on wind currents, on mean and extreme temperatures, in short, on the characteristic conditions of heat and atmosphere which, together with geographic location, constitute climate?

A rich field for investigation lies in wood utilization. This fact is already keenly appreciated, and manufacturers of lumber and wood products are most desirous of learning all there is to learn about the strength of our commercial woods and the best ways of handling them, and about the economies which can be effected in manufacture and construction work. They have expressed an urgent desire to see investigations of this character pressed by the Forest Service. The timber tests already completed and now being carried on by the Service, though as extensive as funds and facilities permit, cannot begin to supply the full facts which wood users of all classes are calling for. They suffice to show, however, that very much is to be expected from more exhaustive tests.

It is vain to hope for a slackening

in the demand for the better timbers, and equally vain to count on finding a supply indefinitely. The severest economy is therefore urgent, and this can be safe only when the true strength of the desired woods is known. Where the end of supply is plainly in sight it is necessary, if possible, to draw upon little used woods as substitutes, and the less a given wood has been used the greater, naturally, is our lack and need of knowledge regarding it. All investigations leading to saving and substitution will prove of priceless value when we begin to enter, as soon we must, the period of scarcity that is to intervene between the exhaustion of our prime virgin timber and the coming to merchantable size of the second growth, for which our excessive early cutting has prepared the way so ill.

The suggestion of some of the novel and useful data which this country may be destined to contribute to the science of forestry naturally leads to the subject of the benefits which are assured on both sides of the Atlantic through the affiliation of the United States with European countries in the International Association of Forest Experiment Stations, noted elsewhere in this issue. Each of the lines of investigation just mentioned will be greatly furthered by the increased mutual exchange of knowledge and criticism between American and European foresters. With this step, the field of investigation has become practically world-wide; whatever is undertaken here, whatever is undertaken abroad, all forest science will have a share in the glory and all forest practice, directly or indirectly, a share in the benefit.



PROGRESS ON PUMPING PROJECTS

Unique Irrigation Works Being
Constructed in Middle Northwest

BY

F. H. NEWELL

Chief Engineer U. S. Reclamation Service

AFTER a recent visit to the Dakotas and Montana I am able to say that rapid progress has been made on the several pumping projects in North Dakota.

These projects contemplate taking water from the Missouri River for use on adjacent lands. A thorough reconnaissance of the state has been made in co-operation with the State Engineer, Mr. A. L. Fellows, and it has been found that there are very few localities where any considerable area of land can be irrigated in the ordinary way by gravity ditches. There are tracts of from 5,000 acres to 10,000 acres and upwards scattered along the stream in the western part of the state, but in each locality it will be necessary to store the water at considerable expense, more than can be considered at present, owing to the distance from lines of railroad.

A general review of the situation in North Dakota indicates that development though irrigation must be along lines which are somewhat unique, namely, by pumping water from the river instead of taking it out by gravity. It is fortunate that throughout the part of the state where pumping is feasible there are considerable beds of lignite, thus affording a cheap fuel. Taking advantage of this the Reclamation Service is endeavoring to make a demonstration of the feasibility of procuring water in this way.

One of the chief difficulties encountered in pumping from Missouri River is the fact that the stream is continually cutting its banks, and thus it becomes almost impossible to locate any structure like a pump on the banks un-

less enormous expense is incurred in protecting it from the scour of the stream. This is particularly the case where the banks are somewhat low as they are along the irrigable areas. The engineers of the Reclamation Service have, however, attempted a solution of this difficulty in a very ingenious manner. They are building the power house and placing the heavy machinery for developing power at the coal mines, and are conveying the power by electric conduits to pumps which are located, not in substantial buildings on the banks, but upon barges moored to the shore.

It is the intention during the winter season to draw these barges out of the river and haul them to points where they will be safe from ice gorges and sudden freshets. After the spring floods have subsided the barges can be launched and suitable connections made so that the pumps will deliver the water into several basins located at sufficient distance from the shore to be safe from encroachment by the shifting river.

The work on construction of settling basins, power houses, and distribution system is well advanced, and it is expected that the machinery will be put to the test in the spring. The difficulty, however, of securing labor and of getting machinery is such that it is impossible to make predictions with any degree of assurance.

There is a body of land of about 20,000 acres which will be placed under irrigation by gravity. This tract lies in the extreme western end of North Dakota between the Yellowstone and Missouri rivers. This land

will be reached by canals which head on the Yellowstone River about 20 miles below Glendive, Montana. The land is of excellent quality, and will be susceptible of a high degree of development.

Reclamation work in Montana has advanced rapidly in spite of the difficulties of securing adequate labor. Many of the contractors have failed or have been on the verge of bankruptcy owing to the difficulty of securing laborers and the advance in price of the necessities of life.

On the Huntley project, which is situated on the northern end of the Crow Indian reservation, the main canal and distributing system are nearly completed. About 2,000 small structures have been built for distributing the water, these consisting mainly of headgates, drops, turn-outs, culverts, and bridges.

On the Lower Yellowstone, in the extreme eastern end of the state, the headgates of the main canal have been

constructed, these being placed flush with the bank of the Yellowstone River in a high bluff, in such position that it is not believed that ice gorges will injure them. The dam on the Lower Yellowstone has been let after much delay, owing to the difficulty of securing favorable contracts. The main canal is reaching completion and a considerable part of the distributing system is also well along.

On the Sun River work is progressing favorably on the subdivision of the lands and the preparations for early construction. There are a large number of legal questions and matters connected with rights of way yet to be settled.

On the St. Mary River the canal construction is well under way, both by Indian labor and by machinery. This work is not only of great magnitude, but it is situated at an altitude such that the long winter seriously interferes with rapid progress.

ALL INDUSTRIES FURTHERED BY NATIONAL FORESTS

Secretary of Agriculture in His Annual Report
Clearly Shows Their Lasting Benefit to the West

THE Report of the Secretary of Agriculture for 1906 contains a highly interesting exposition of the National forest policy now taking shape in the development and use of the reserves. The broad principle on which this policy rests is to secure to all the people, equitably, through public ownership of a great natural resource, the fullest and most lasting benefit from it. It is the same principle in accordance with which the President, in his message to Congress, recommends the withdrawal and use of the public coal lands. "The withdrawal of these coal lands," writes the President, "would constitute a policy analogous to that which has been fol-

lowed in withdrawing the forest lands from ordinary settlement. The coal, like the forests, should be treated as the property of the public, and its disposal should be under conditions which would inure to the benefit of the public as a whole."

The report concerning the work of the Forest Service was partly as follows:

GROWTH OF RESERVE BUSINESS.

In area the reserves were increased during the fiscal year 1905-6 from 85,693,422 to 106,999,138 acres. In revenue they brought in \$767,219.96, as against \$60,142.62 for the previous year. In timber sales there were dis-

posed of for immediate or early removal nearly 300,000,000 board feet of lumber at stumpage prices ranging up to \$4 per thousand (besides other material to a large value), as against 96,060,258 board feet, with a maximum price of \$2.50 per thousand in 1904-5, and 69,257,710 board feet in 1903-4. The number of free-use permits granted in the same years also showed progressive increase. In the year 1904-5 the reserves were under Forest Service control only after February 1.

One fiscal year of full control has established two important facts—that the reserves advance the present interests of the people of the West and that they will speedily pay the cost of administering them.

BENEFIT TO INDUSTRY.

These national forests are being made useful now. The benefits which they are to secure are not deferred benefits. Through Government control the interests of the future are safeguarded, but not by sacrificing those of the present. Far from handicapping the development of the states in which they lie, the reserves will powerfully promote development. They work counter to the prosecution of no industry, and retard the beneficial use of no resource.

The wealth of the West lies, and will long lie, in what the soil will produce and in what the earth hides. Labor and capital will here find employment mainly in turning to use the farm land, grazing land, timber land, and mineral lands of the region, and in the commerce to which these great productive industries will give rise. That the reserves beneficially affect all of these industries is becoming clearer to the people of the West every day, and in consequence the policy of public administration of our unappropriated timber lands becomes more and more firmly established in the approval of a united public sentiment. Local sentiment has sometimes been unfavorable to the creation of reserves before their effect upon the public welfare was understood; but opposition

has always dissolved under the test of actual experience.

PROMOTION OF AGRICULTURE.

The reserves do not withhold land from agricultural use, but greatly increase the amount of available farm land. Though they were made from the most rugged and mountainous parts of the West and were intended to include only land unsuited for agriculture, by the act of June 11, 1906, the right is given settlers to homestead within the reserves wherever strips and patches of tillable land can be found. At the same time, through their water-conserving power, these forests fix in regions of scanty rainfall the amount of land which can be brought under the plow, since at best much otherwise fertile land must go uncultivated for want of water. Without forest preservation much of the land now under irrigation would have to be abandoned again to the desert. Thus the promotion of agriculture is one of the main ends of the forest-reserve policy.

SUPPLIES FOR MINING.

Mining in the West is mainly in regions surrounded by reserves or included within them; but the reserves do not impede the development of mineral resources. On the contrary, by guaranteeing future supplies of timber they are indispensable to the future development of these resources, as the great mining interests well know. They do not interfere with the prospector, who has the same right to prospect and locate in forest reserves that he has on any other part of the public domain.

PROTECTION OF GRAZING.

Administrative control of the forest reserves is beneficial to the grazing industry. The sentiment of stockmen throughout the West is unitedly in favor of such control, because of the gain to them now that the reserve ranges are safe from overcrowding and deterioration. Thus the rights of the individual user are respected, and

the permanence of this great resource is assured. I wish to commend particularly in this connection the heartiness and good spirit with which the associations of western stockmen have co-operated in our efforts to enforce fair and just measures for the regulation of grazing in the interest of the public, to whom these forests belong. The charge of a grazing fee, made for the first time during the past year, though reasonable in view of the advantages of grazing regulation to the stockmen and the cost of reserve administration to the Government, and justly due in the interest of the public, might have been expected to cause dissatisfaction and friction. On the contrary, as soon as the reasons for the charge and the method in which it would be applied had been explained, it was generally approved and paid willingly and promptly. It was followed by no falling off in the number of stock grazed in the reserves. In some cases the associations of stockmen have voluntarily aided the Service in settling local difficulties. Their whole conduct has shown remarkable moderation, far-sightedness, and readiness to recognize and accept what is in the permanent interest of their industry, even though it involves the sacrifice of immediate personal advantage.

LUMBER FOR USE.

Finally, Forest Service administration of the reserves is beneficial alike to the lumber industry and to the timber-consuming public. There is now standing on the reserves not less than 300,000,000,000 board feet of merchantable timber. This is not locked up from present use as a hoarded supply against future needs; it is ready for the immediate demands of a developing country. It will not be rushed upon the wholesale market in competition with the cheap stumpage prices of private owners anxious for ready money, and it will not be disposed of under a shortsighted policy of utilization which would leave a gap between the end of the present supply and the

oncoming of the second crop; but it is and will continue to be available, first for the small user—home-builder, rancher, or miner—and then for the needs of lumber concerns, large miners, and railroads for which a timber supply is indispensable, and which in turn are indispensable to the prosperity of the West.

WOOD FOR THE FUTURE.

The supply of timber furnished by the matured crop now on the ground is so vast in proportion to the present demand that there might seem to be no need for caution in its use. Were no more cut than last year it would suffice for four hundred years. In the mature forest production is at a standstill, so that from the point of view of the largest possible production of timber lumbering under such methods as will insure a second crop is highly desirable. The demand upon the reserves, however, is as yet insignificant in proportion to even the present need, most of which is met by the supply from private holdings. The reserves form the heart of the western timber lands. They are generally less accessible than the private holdings which surround them, and would naturally form the last resource of the lumberman. They must be so maintained as first of all to be ready to meet the future demands of the regions in which they lie. With a growing population and expanding industries these demands will far exceed those of the present. The crucial problem of management will be to insure a timber and water supply for the great West, and to conserve the summer stock ranges. To meet it successfully will require careful foresight and the best technical information. Timber sales are now made with strict attention to the welfare of the forest, and at stumpage prices often decidedly in advance of the market.

RESERVES SOON SELF-SUSTAINING.

The income from the reserves is as yet but a small fraction of what may be expected as they approach full util-

ization. Yet their administration is already on a sound business basis. Not only are they meeting from their receipts a very large part of the cost of their maintenance; they are even now beginning to show a decided decrease in net expense to the Government. My estimate of the appropriation necessary to meet the general expenses of the Forest Service is less by \$100,000 than the appropriation of last year, notwithstanding that the total area of the reserves has been substantially enlarged by executive action; that increasing use necessitates greater expense of administration, and that in general the work of the Service is growing very rapidly. Though the administration of the reserves forms but a part of the field of work, it may confidently be expected that within five years from the transfer of the reserves to this department the Forest Service will cost the taxpayer nothing whatever.

REVENUE FROM PRIVILEGES.

In reaching this result no unjust burden will have been laid on any interest. As public property the national forests should yield to the public a reasonable return for whatever of value private individuals secure from them for their own profit. In accordance with this principle, applicants for special privileges—as rights of way, reservoir sites, powerhouse sites, and similar concessions—have been called upon to pay for such privileges on the basis of their commercial value. For example, in the case of water powers duly located under the state laws, but which can not be developed without the occupancy of reserve land, besides a charge for the land occupied, based on its value as forest land, a small charge per unit of power developed is made, not for the use of the water itself, which is clearly private property, but for the conservation of the supply which the preservation of the forests furnishes, and which, were it not for the existence of the reserve, the water-power owner could secure only by himself acquiring great bodies of forest land. Such a charge is essentially

similar to the charge for stock grazed upon the reserves. It is a return for actual value received, and throws upon those who profit by public control of the reserves a share of the cost of maintaining that control.

LOSS IN TAXES OFFSET.

By wise and just provision of Congress in enacting at its last session that 10 per cent of the gross receipts from the national reserves shall be made over to the several states in which they are situated, for the benefit of the counties which would otherwise receive no revenue from a part of their area, a real grievance was redressed. Even with the present use of the reserves the benefits thus reaped from them by the communities in their neighborhood are of substantial importance. As time goes on the importance of this provision will increase, and eventually the counties will find themselves far better off than they would have been without the reserves, for private ownership followed by exploitation would have destroyed the sources of revenue by leaving little or nothing of permanent taxable value, whereas now every resource is conserved and will be made to pay its just share of income. Since the fundamental purpose for which reserves exist is to secure the best permanent use of all resources, their effect is to add to property value, and by turning over 10 per cent of their gross receipts to local use they will contribute far more to the local public needs than the taxes they would pay if they were private property.

PROTECTION FROM FIRE.

Protection of the reserves from fire has been the most important task laid upon the Forest Service. It is cause for congratulation that the loss by fire during the year was so slight. Indeed, the saving which resulted from the organized care of the reserve force was undoubtedly worth more than the whole cost of administering the reserves. Only about eight fires of any consequence occurred on the reserves

during the calendar year 1905, a season of extreme dryness and one in which under ordinary circumstances the damage from fires should have been unusually large. This small number was due in large part to the system of patrol, which leads to the dis-

covery of fires before much damage has been done. So far during the calendar year 1906 the damage from fire has been extremely small, even in comparison with that in 1905. Increased efficiency of the patrol system, has led to this favorable result.

THE RECLAMATION FUND

Table Showing Increase During Past Year
and Total Amount Available for the Con-
struction of Government Irrigation Works.

According to a recent Land Office report the present status of the Reclamation fund, composed of all moneys received from sales of public lands in the Arid States and Territories, is as follows:

State or Territory	Increment to fund during fiscal year ending June 30, 1906.	Total reclama- tion fund to to June 30, '06.	Restricted fund 51 per cent.
Arizona.....	\$ 54,649.71	\$ 298,417.90	\$ 152,193.13
California.....	248,647.12	2,571,704.81	1,311,569.15
Colorado.....	508,866.67	2,478,600.56	1,264,086.29
Idaho.....	301,234.62	2,335,934.14	1,191,326.41
Kansas.....	75,370.50	215,245.19	109,775.05
Montana.....	500,746.32	2,647,433.77	1,350,191.22
Nebraska.....	77,373.12	749,222.69	382,103.57
Nevada.....	45,597.92	110,527.04	56,368.79
New Mexico.....	202,015.97	723,365.27	368,916.29
North Dakota.....	933,803.07	5,374,395.01	2,740,941.46
Oklahoma.....	411,050.35	3,538,753.72	1,804,764.40
Oregon.....	461,281.65	5,230,661.99	2,667,637.61
South Dakota.....	262,308.72	1,285,480.85	655,595.23
Utah.....	70,211.56	432,287.95	220,466.85
Washington.....	494,182.57	3,545,615.58	1,808,263.95
Wyoming.....	234,744.23	1,420,545.65	724,478.28
Total.....	\$4,882,084.10	\$ 32,958,192.12	\$16,808,677.98

The figures representing moneys received during the past fiscal year may be slightly revised when the reports have been finally audited by the Treasury Department of the United States.

CONSERVATIVE LUMBERING IN CANADA *

Would It Be Practicable for the Owners of Canadian
Timber Limits to Practice Conservative Cutting?

BY

E. STEWART

I HAVE asked a question here which cannot be correctly answered by "Yes" or "No." It may, however, be safely said that it would be as impracticable for the lumbermen of Canada as a whole to adopt the intensive systems of Germany and other European countries, admirable as they are there, as it would be for them to introduce all the timber trees of those regions into this country and expect them to flourish under the changed conditions prevailing here. On the other hand I think the day has arrived when improved methods would be practicable and profitable in very many of our white pine forests.

In the few remarks I make to-day I wish to deal with this question, not as a forester desiring to see forestry practised for the benefit of the whole community, for the conservation of the water supply and the enormous advantages which the perpetuation of this supply will render in the future for motive power, important as these matters are, nor do I wish to deal with the question of a timber supply for future generations. These considerations we will leave entirely aside, for the sake of brevity, and simply look at the question as business men, owning property and desiring to make the most possible out of it.

In the first place let me ask you to take a pine tree, say eleven inches at the stump, growing on a limit two or three hundred miles from a mill here in Ottawa. That tree will perhaps make two twelve foot logs of an average diameter of nine inches. According to Doyle's rule that tree will yield thirty-eight feet board measure of lumber, principally sap.

The cost of handling these small logs from the time they leave the dump till they pass through the saws is very nearly equal to that of two logs two or three times their size, to say nothing of the number of them that sink on their way down the streams. Does it pay even after these logs or poles have reached one of our large mills to keep the large number of men there employed waiting while they are going through the saws, especially when the product is not valuable?

But provided there is a small margin of profit, the question I wish to bring before you is whether it pays best to cut such timber or to allow it to stand till the yield from the same tree will be say five times as great, and the product of a much better quality, not to mention the increased price of the product which, with some fluctuations, is constantly increasing and will continue to increase.

*Address delivered at the Summer Meeting of the National Wholesale Lumber Dealers' Association of the United States, held at Ottawa, Canada.

I am quite aware that there are many things to be taken into account before it can be decided whether it will pay to reserve the smaller timber and maintain a constant supply by rotation cuttings. This is a matter for investigation by the owner. I am of the opinion that on many of our white pine limits this practice could be put into immediate operation to the great advantage of the owners. In other cases where there is very little young timber the reverse might be the case. What I would do if I owned a limit on which there was a stand of pine of all ages, as is usually the case, would be to have a careful examination of it made, giving an approximate estimate of all the pine down to say twelve inches in diameter at the stump and of the quantities below that size, specifying the number of trees at from twelve to ten inches, from ten to eight inches, from eight to six inches and from six to four, and all under that size, with a stem analysis to ascertain the rate of growth per annum. By this means it would simply be a matter of calculation whether I should cut such a limit close, or cut down only to say twelve inches at the stump, taking care to destroy as few as possible of the younger trees in felling.

Barring one factor, namely, forest fires, no surer basis for calculation can exist. We would have as one factor annual growth definitely ascertained; another would be the present value of this small timber if marketed at the present time; and the whole question resolves itself into this problem: Will the value of the increment of growth exceed the compound interest on the present value of this sapling stock? But in favor of the conservative method we should also remember that interest is declining in our new country, while the value of stumpage is increasing.

There is, however, another matter which should not be lost sight of in endeavoring to foster the younger growth. In removing the large pines we allow more light into the forest which will be followed by a faster

growth of the young trees that have suffered from too great shade; but these large pines really do not cast nearly as much shade as the broad-leaved trees that usually grow mixed among the pines, and in the examination to which I have referred it would be well to have those doing the greatest injury in this way to the young pines marked, and where possible, removed.

In this work of survey or examination of the limit and marking of the timber it is quite unnecessary to mark every pine that is to be immediately cut. With intelligent men instructions to cut nothing under a certain diameter should be sufficient.

The lumbermen now conduct their affairs with great attention to details. They know the cost of logging, driving, sorting of logs, milling, piling, and shipping, to the minutest detail, but it seems to me that they should commence one step further back and in their profit and loss account be able to state the value of the timber on their limits, not only that which is immediately merchantable, but that crop which is constantly growing and on which they can rely with the greatest certainty, if proper care is taken to prevent its destruction by fire. The farmer values his growing crop, but a grain crop is liable to be destroyed by rain, or by lack of it, by rust and other destructive agencies which seldom affect the growing pine.

High as stumpage is now, when the increased use of timber is taken into account and the decrease in the supply, it seems inevitable that it will continue to greatly increase in the future. It was thought by many that with the increased use of iron, brick, stone and cement in structural works the demand for timber would decrease, but statistics not only show an aggregate but a *per capita* increase in recent years. When we consider this and take a survey of the visible supply in the northern hemisphere we cannot but regard the warnings of a timber famine as procained by the ablest for-

esters of the present day as well founded.

M. Mélard, in a recent work entitled *The Insufficiency of the World's Supply of Timber*, says: "There are but few countries in the north temperate zone at present able to supply large quantities of timber. Five are in Europe, namely, Austria-Hungary, Sweden, Norway, Finland, and Russia; two are in North America, namely, Canada and the United States. It has been shown that the available surplus of Austria-Hungary, of Russia, and the United States, is seriously threatened by increase of population and by industrial development, and that of Norway by the abuse of the axe. There remain only three sources in which confidence can be placed for yet a little while; these are Sweden, Finland, and Canada. They are absolutely and hopelessly insufficient. If Sweden, Finland, and Canada were to attempt to supply all the countries which reach out their hands for timber their normal production, and their forests, too, would be disposed of completely in a very short time, revenue and capital alike." He concludes with the remark that "a timber famine is thus within sight."

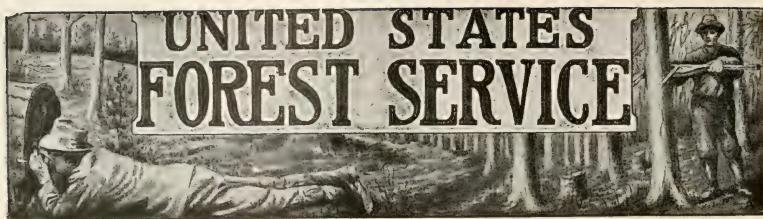
Considering all these facts it seems to me certain that not the least valu-

able part of many limits is the younger growth which at present, as I have endeavored to show, scarcely pays the cost of cutting, and that the owners of timber, especially of white pine, would only be acting with the foresight they show in other details of their business if they gave greater attention to this matter than heretofore.

The time has arrived when the man who directs the lumberman's operations in the woods should have, in addition to his practical knowledge of how to cut and take out logs to the best advantage, also some knowledge of the tree itself, the manner and rate of its growth and how to cut the other timber so as to foster that growth. In other words, he should be a forester as well as a practical logman, and it is fortunate that many young men, a majority of whom have been brought up in our rural districts, are now studying forestry in the colleges of the United States and Europe and spending their vacations in our lumber woods, studying the practical part of the business; and I would strongly advise our lumbermen to avail themselves of the assistance of such men where in addition to their theoretical knowledge they prove themselves to be practical as well.



Bristow Adams.



The Month in Government Forest Work

Legal Matters

The investigation of alleged illegal mining claims will be extended to the Prescott Reserve, Arizona, during the month of December. The work will be performed by Geologists L. G. Gillett, W. L. Walker, and S. H. Ball. They will probably examine claims of like character in the Lincoln Reserve, New Mexico, after concluding work in the Prescott.

The Forester has directed the supervisor of the Tahoe Forest Reserve, Cal., to seize any timber cut from the vacant odd sections of land returned as mineral by the survey, within 10 miles of the line of the Central Pacific Railroad.

This timber was originally granted to the railroad company by the acts of July 1, 1862, and July 2, 1864, and the Forester held, as a basis for his directions to the supervisor, that the failure of the railroad company to remove the timber within a reasonable time terminated its rights, since it could not be presumed that Congress intended to grant to the railroad company a perpetual easement in the land for the purpose of growing timber.

This decision will apply to timber on mineral odd sections within the 10-mile limit of the Central Pacific and Union Pacific railroads.

The Attorney-General has been requested to begin suits in the following cases: Orenshaw, saloon, Alexander Archipelago Reserve; Thomas Shannon, contempt proceedings to punish for violation of injunction, Little Belt

Reserve; Merin Marshall, fire, Weiser Reserve.

In the case of J. H. Schworer, privilege trespasser in the Bitter Root Reserve, the Forester rejected the application of a defiant trespasser for the classification, listing, and opening to homestead entry under the act of June 11, 1906, of land held by him in trespass.

Simon Romero was arrested on October 28 for grazing trespass on the Jemez Reserve and held in default of bail in the sum of \$250. On November 21 Romero's offer of \$108.15, in settlement for the civil damages was accepted.

In the following cases offers of settlement for the civil damages have been accepted: M. H. Knapp, ejectment, Blue Mountains Reserve; Benton R. Bailey, timber trespass, Klamath Reserve; Alta Russell and John Russell, timber trespass, Mount Rainier Reserve; Andrew Norrell, grazing trespass, Park Range Reserve.

The following special privilege permits for power-developing projects were issued by the Forester between October 15 and November 15:

Stanislaus Electric Power Company: Dam, conduit, and power house on Deadman Creek; dam, conduit and power house on Upper Stanislaus River; dam and reservoir on Relief Creek; dams and reservoir at Kennedy's Meadow, on the Stanislaus River; a wagon road and camp site to be used in the construction work carried on by

the company; all in the Stanislaus Reserve, California.

Nevada Power Mining and Milling Company: Reservoir and pipe line in the Northern Division of the Sierra Reserve, California.

Tuolumne Electric Company: Alpine, Tamarack, and Las Vegas reservoirs, together with a camp site to be used in construction work in the Stanislaus Reserve, California.

nal Company, reservoir, Battlement Mesa Reserve, Colorado; Washington Irrigation Company, reservoir, Uinta Forest Reserve, Utah; Colorado and Grand River Railroad Company, railroad, Medicine Bow Reserve, Colorado.

Forest Management

The following rules are being carried out in marking timber on the Allen Gold Mining Company sale of



MEETING OF SUPERVISORS ON ARIZONA RESERVES AT FLAGSTAFF.

Reading from left to right beginning with front row—Harold Marshall, J. B. Adams, R. C. McClure, L. C. Miller, J. S. Holmes, J. W. Farmer, T. F. Meagher, L. F. Kneipp, W. H. Reed, John Kerr, J. H. Allison, E. F. Morrissey, Mrs. Morrissey, Mr. Breen, F. S. Breen, F. C. W. Pooler, A. J. Norton.

The following right-of-way cases, referred from the Department of the Interior to the Forester for report, as to whether the projects would interfere with forest-reserve interests, were returned to that Department between October 15 and November 15 with favorable reports by the Forester:

Harry Hale and G. A. Pulver, reservoir, Battlement Mesa Reserve, Colorado; Mesa Creek Reservoir and Ca-

50,000,000 feet in the Hell Gate Forest Reserve:

(1) Cut in alternate strips of 150 and 75 feet in width, respectively, varying the location of these strips to conform to the nature of the stand, the strips to run with the slope.

(2) Cut everything merchantable from the 150-foot strips.

(3) In the 75-foot strips leave groups of seed trees covering at least

one-half the area of the strip and separated by openings running across the slope.

(4) Leave for seed, trees from 7 to 11 inches in diameter, inclusive, considering the ideal seed tree as a 10-inch tree. Trees of 12 inches and over are to be left for seed only when smaller trees are lacking.

(5) Leave for seed sound trees so far as possible, but remember that injured lodgepole decays slowly, and that it is far more important that the groups should be full than that they should consist of perfect trees.

(6) To state Rule 5 differently, cut from the groups everything that will make lagging, converter poles, or 10-inch stulls, except when the scarcity of other material makes the leaving of some stull trees necessary.

(7) All trees to be thrown and brush to be piled outside the groups. In no case need refuse larger than 6 inches in diameter be piled for burning.

Wherever possible, spruce should be favored in the reproduction as against lodgepole pine.

The forest is mainly a pure stand of lodgepole pine substantially even-aged but of various diameters. These rules do not apply to those portions of the stand where old trees are standing in the midst of even-aged younger growth, or where the condition of the forest makes scattered seed trees necessary.

A number of lumber companies which have suffered heavy losses by windfall of boxed trees and by reduction of grade through deep chipping have abandoned turpentine their pines before lumbering. The Kaul Lumber Company, of Birmingham, Ala., among others, is looking earnestly to the possible application of the improved method of chipping with which the Service has been recently experimenting in Florida, and has applied to the Service for information and advice.

The Service herbarium now includes specimens of most of the tree species indigenous to the United States. In

order, however, to make it complete and of fullest use it is necessary to obtain specimens of the species still unrepresented, as well as duplicate specimens of the represented species from different parts of their range, so that as far as possible variant as well as typical characters may be illustrated.

The specimens on file have been gathered almost entirely by members of the Service. A circular of instructions and requests to field members of the Service is shortly to be issued as an aid to collecting specimens now lacking.

A structural study of wood from "dead" trees has been undertaken for the purpose of finding a practical means of distinguishing such wood from seasoned or partly dried wood from live trees. Consumers of pole and tie timber are having difficulty in separating "dead" and "live" wood stock which is purposely or otherwise made up of dead and live timber. Moreover, for many purposes, the dead wood of some species is very inferior in durability and strength to the wood of live trees.

The special influence which the protective covering of tree fruits and seeds have upon the germination of seeds is being carefully studied, microscopically and otherwise, in order that better directions may be given in the storage and planting of such seeds. Wide variation exists in the time and percentage of germination of seeds of the same species, though they have similar coverings. A like variation exists between seeds of different species but with similar coverings. Their behavior under the same storage conditions is also strikingly variable, without apparent reason. It is expected that the investigation now under way will throw light upon the many practical difficulties connected with the handling and germination of tree seeds.

Forest Extension

Reports on watershed studies in the Elkhorn and Helena reserves have been received from J. F. Bond. He finds that forest planting will not be

advisable to benefit city watersheds in either reserve, since they are fairly well forested, and such small areas as occur are unimportant or are unfavorable for planting. He recommends, however, that intensive fire protection be given, that grazing be restricted, and that no timber cutting be allowed except for local use on the watersheds of Basin Creek in the Helena Reserve

Plans for nine rangers' nurseries in the Jemez Reserve have been submitted by F. J. Phillips. Most of the sites are at elevations of from 7,000 to 9,000 feet. The recommendations cover the preparation of the ground, seed collecting, and planting. Yellow pine, red and white fir, and Engelmann spruce are to be used.

J. D. Guthrie has reported that there



MEETING OF SUPERVISORS OF OREGON RESERVES AT PORTLAND.

Reading from left to right, beginning with front row—A. S. Ireland, M. L. Erickson, J. B. Adams, D. D. Bronson, G. B. Coleman, F. E. Olmsted, H. K. O'Brien, S. S. Terrill, D. B. Shuller, S. C. Bartrum, W. H. B. Kent, E. T. Allen, G. F. Allen, Fred Hanson, H. F. Potter, John M. Schmidt, G. W. Milham, E. E. Carter

and of McClellan and Beaver creeks in the Elkhorn.

S. N. Spring, who has been conducting watershed studies on the Leadville and Sevier reserves, finds that while the general water supply for towns depending on reserve drainage basins is adequate, planting is much needed to improve the stream flow for irrigation purposes.

are few desirable sites for rangers' nurseries in the San Francisco Mountains and Grand Canyon (South) reserves. One site has been selected in the latter reserve and a small nursery established and two sites have been selected in the former.

As noted in the November program, a promising watershed planting project has been found in the Pecos Re-

serve. Headquarters for a nursery and station will probably be established on Santa Fe Creek, about six miles from Santa Fe, on the Amanda Boardman ranch, which the president of the Santa Fe Water and Light Company has offered to purchase and place at the disposal of the Government for nursery purposes.

About 50,000 seedlings from the Henninger's Flat nursery will be planted by rangers in the San Gabriel and San Bernardino reserves as soon as the rainy season begins. Rangers will receive about 1,500 trees each, with instructions for planting them in favorable situations in their districts. In this way the seedling output will be increased at slight expense and a large number of experimental plantations will be started throughout the reserves.

Work on the new station building at the Halsey station is progressing rapidly. It is expected that the building, which is to be a 1½-story concrete block structure, will be completed during the winter.

As part of the new record-keeping system for the planting stations a set of cards has been issued covering "seed sowing," "seedlings," "transplants," "field planting," "field plantations." The cards, which give a complete record of nursery and planting operations, seedlings on hand, and condition of plantations, are to be filled out in duplicate on May 15 and November 1 each year. One set is to be sent to Washington and the other retained for the station files.

An examination of the lands of the Lehigh Coal and Navigation Company in Monroe, Carbon, and Schuylkill counties, Pa., has been completed by A. S. Peck. These comprise four separate tracts of about 60,000 acres and offer an interesting variety of forest conditions.

The Monroe county lands are held to protect the headwaters of the Lehigh River. Most of this region has been denuded of merchantable species, so that forest planting is necessary, and in order to make this practicable the fire danger must be reduced. The

planting plan for about 1,100 acres in the vicinity of Tobyhanna, Pa., already submitted to the company, provides for the planting of Scotch pine, short-leaf pine, red pine, pitch pine, white pine, European larch, Norway spruce, tamarack, and red oak, with a view to demonstrating the best treatment for the remainder of the lands in this region. Its recommendations include a fire patrol, the clearing of fire lines, the use of old roads in fire fighting, and the building of a watch tower.

The Carbon county and Schuylkill county lands are naturally favorable for chestnut, red oak, European larch, and Scotch pine. The demand for timber of all sizes for use in the mines will make forest planting profitable, provided that fire is prevented. A report will be submitted later recommending planting for a small typical area capable of being protected from fire at slight expense. It will be advised that a forester be employed to have full charge of this tract and to assist the superintendent of the Monroe county lands, who has himself had some training in practical forestry.

The study of tree planting in agricultural regions in California, in cooperation with the state, is practically completed. S. J. Flinham, who has been engaged in this work, is now preparing a report on eucalyptus planting, which is part of the general planting study, and before returning to Washington will secure the additional data needed for a report on planting on nonagricultural lands.

Forest Products

A series of experiments are now in progress at Escanaba, Mich., to further test the open-tank method for treating telephone poles. Arborvitae poles are now being tried to supplement last year's tests on chestnut and white cedar. An average penetration of three-fourths of an inch, with a maximum of over an inch, has already been secured on the arborvitae.

Brush treatments with carbolineum and creosote are also being tried on the arborvitae poles. At the comple-

tion of this series of tests poles will be set in an experimental line for the purpose of obtaining comparative results.

The Forest Service has recently been investigating the method of treating tamarack and hemlock ties used by the Chicago and Northwestern Railroad at its plant at Escanaba, Mich. A number of ties have been cut at various seasons of the year and allowed to season, and are now being

with seasoned untreated and green untreated ties, will later be placed in an experimental tract for comparative tests.

C. G. Crawford, after an inspecting trip to the mines of the Philadelphia and Reading Coal and Iron Company, reports highly encouraging progress in the experimental treatments which the company is carrying on to ascertain the best methods of handling and



MEETING OF SUPERVISORS OF CALIFORNIA RESERVES AT NORTHFORK.

Reading from left to right, beginning with front row—E. S. Mainwaring, J. B. Adams, M. B. Elliott, S. L. N. Ellis, C. H. Shinn, Geo. A. Coleman, J. R. Bell, R. L. P. Bigelow, W. M. Slosson, L. A. Barrett, A. H. Hogue, Coert DuBois.

treated in a series of experimental runs at the Escanaba plant. It has been found that green tamarack and hemlock weighing as much as 48 and 50 pounds per cubic foot can not be treated successfully, but that when the timber is seasoned to a weight of 38 to 42 pounds per cubic foot good results can be obtained. Both the Burnettizing and the Wellhouse processes have been used. The treated ties, together

treating mine props. Though the treated timbers have been in the mines only about four months their superiority is shown by the fact that they remain free from the decay which has attacked the untreated timber. Plans are now under way for the erection of a small commercial plant to test further the advisability of using treated timbers on a larger scale.

W. E. Herring, formerly connected

with the Irrigation and Drainage Investigations of the Department of Agriculture, has been placed in charge of the Section of Reserve Engineering and will have general supervision of all engineering work on reserves done by private interests or by the Forest Service.

Tests to determine the relative strength of the various timbers on the reserves are in progress at the Service testing station at Seattle, Wash. The test material now on hand includes Alpine fir and Engelmann spruce from the Pecos Reserve, New Mexico; red fir and western yellow pine from the Pikes Peak Reserve, Colorado; Alpine fir, Engelmann spruce, and lodgepole pine from the Medicine Bow Reserve, Wyoming.

J. B. Knapp, in charge of the Service timber-testing station at Eugene, Oregon, has accepted the directorship of the testing laboratory of the University of Oregon, where the testing station is located.

During the past six months M. Cline has spent a month or more at each of the timber-testing laboratories, in order to have the testing methods up to a uniform standard of efficiency.

Addresses The following addresses on forestry subjects were delivered in November:

Northeastern Iowa Horticultural Society, Charles City, Iowa, November 20 to 22; H. P. Baker.

National Slack Cooperage Manufacturers' Association, Chicago, Ill., November 21; Findley Burns.

National Hickory Manufacturers' Association, Chicago, Ill., November 22; H. B. Holroyd.

University of Georgia (opening of course in forestry), Athens, Ga., November 27; Alfred Gaskill.

Wm. L. Hall has accepted an invitation to address the Railway Club of Pittsburg, Pa., on the evening of December 28. His subject will be "Economy in Using Railroad Timber."

Dr. A. L. Dean attended a meeting of the Leather Chemists' Association

in New York City November 22 and 23. The chemists state that all oak extracts are now adulterated.

Grazing A. F. Potter, inspector of grazing, returned to Washington November 25. The grazing arrangements and authorizations for 1907 will be taken up and acted upon without delay.

Reserve Organization The Ekalaka Reserve, Montana, established November 5, has been placed under administration, with Supervisor J. F. Smith, of the Black Hills Reserve, in charge, with headquarters at Deadwood, S. Dak.

Supervisor Ira E. Todd, of the Little Belt Reserve, Montana, has assumed charge of the Snowy Mountains Reserve, Montana, created November 5, with headquarters at Neihart, Mont.

The Big Hole Reserve, Montana, established November 5, is now under administration, with Supervisor J. B. Seely, of the Madison Reserve, in charge of the Southern Division, with headquarters at Sheridan, Mont., and Supervisor E. A. Sherman, of the Hell Gate and the Montana Division of the Bitter Root reserves, in charge of the northern portion, with headquarters at Missoula, Mont.

The Sierra Madre Reserve, Wyoming, established November 5, has been placed under administration, with Supervisor L. G. Davis in charge, with headquarters at Saratoga, Wyo.

The Crazy Mountains Reserve, in Montana, established August 10, has been placed under administration, with E. C. Russell, Forest Supervisor, of the Absaroka Division of the Yellowstone Reserve, in charge. The Supervisor's headquarters will be at Livingston, Mont.

The Pryor Mountains Reserve, in Montana, established November 6, has been placed under administration, with W. H. Pearce, Forest Supervisor, of the Shoshone Division of the Yellowstone Reserve, in charge. The Supervisor's headquarters will be at Wapiti, Wyo.

J. E. Burton and P. T. Coolidge,

Technical Assistants, on the Bitter Root Reserve, in Idaho, and the Big Horn Reserve, in Wyoming, respectively, have been temporarily detailed to the Wyoming Division of the Medicine Bow Reserve. They will mark timber on the 165,000,000-foot sale to the Carbon Timber Company.

F. A. Fenn, Supervisor of the Payette and Sawtooth reserves, in Idaho, has been temporarily detailed to or-

W. B. Greeley, formerly Forest Inspector, has been transferred to the office of Reserve Organization and made Supervisor of the Sierra Reserve (South), California, November 17, to replace Harrison White, resigned.

R. H. Charlton, Forest Supervisor, of the San Gabriel and San Bernardino reserves, reports that the fire-breaks through the chaparral have



SUPERVISORS' MEETING, COLORADO RESERVES, AT GLENWOOD SPRINGS.

Reading from left to right, beginning with front row—W. T. Cox, J. A. Blair, S. N. Spring, J. B. Adams, W. R. Kreutzer, O. C. Snow, D. Bremby, F. C. Spencer, E. R. Hodson, F. R. Sherwin, H. K. Porter, H. French, David Anderson, Harry Gibler, S. N. Husted, F. A. Morrill, Eugene Williams.

ganization work, and will start the administration work of the Coeur d'Alene Reserve, established November 6.

Arrangements have just been made to purchase a 60-foot 40-horsepower boat for the use of Supervisor Langille, of the Alaskan reserves. The irregularity of the country and the long coast line render this necessary for administration purposes. The boat will carry a crew of two men.

proved effective in stopping fires. On November 5 a large fire, carried toward the San Gabriel Reserve by a heavy wind, was stopped completely by a 40-foot fire line which had been thoroughly cleaned and grubbed out.

Robert J. Selkirk has been placed in charge of the newly created Hauchuca Reserve, in Arizona, with headquarters at Patagonia.

David Barnett has been appointed Ranger in Charge of the Charleston

Reserve in southern Nevada, which has just been organized, in order to prevent timber stealing. To assist Mr. Barnett, Deputy Forest Supervisor D. S. Marshall has been temporarily transferred from the Uinta Forest Reserve, Utah.

H. J. Brown, formerly Technical Assistant on the Sierra Reserve (North), has been sent to assist W. J. Weigle in marking timber on the Wyoming Division of the Medicine Bow Reserve.

F. S. Breen, Forest Supervisor of the Black Mesa, San Francisco Mountains, and Grand Canyon (South) reserves, Arizona, has been temporarily detailed to assist in the Office of Reserve Organization at Washington. T. S. Woolsey, Assistant Forest Inspector, will take charge of these reserves during his absence.

On November 1 to 3 a joint Rangers' meeting was held at Monte Vista, Colo. F. C. Spencer, R. W. Shellabarger, and Eugene Williams, Forest Supervisors of the San Juan, Cochetopa and Wet Mountains, and San Isabel reserves, respectively, with rangers, attended. The following technical men were present: R. S. Kellogg, E. R. Hodson, H. S. Sackett, and John T. Wedemeyer.

A. W. Jensen, Forest Supervisor of the Manti Reserve, Utah, reports a very successful rangers' meeting at Ephraim, Utah, October 21 to 27. W. C. Clos, Inspector of Grazing, was present and took part in the discussions on grazing.

Thirteen ranger stations have been established in the San Francisco Mountains Reserve, 18 in the Battlement Mesa, 38 in the Medicine Bow, 11 in the Montezuma, and 14 in the San Isabel.

J. W. Farmer, Forest Supervisor of the Mount Graham Reserve, has been temporarily detailed to examine applications for lands in Arizona made under the act of June 11, 1906. H. A. E. Marshall will assume supervision of Supervisor Farmer's reserve during his absence.

O. C. Snow, Forest Ranger in Charge of the La Sal Reserve, Utah, has made arrangements with the Blue Mountain Telephone and Electric Company by which, in consideration of 500 poles, the Service will be allowed free use of the telephone lines to be constructed between La Sal and Moab, with the additional privilege of attaching to this line at any point.

PALO VERDE: THE EVERGREEN TREE OF THE DESERT*

BY

PROFESSOR FRANCIS E. LLOYD

TO the artist and botanist alike the play of colors in the desert is most fascinating, and not a small part in the change of coloration from month to month is taken by the flowers, which develop in great numbers and with remarkable rapidity after the seasonal rains, which occur in early spring and in the late summer. The fact that there are two rainy seasons in our

southwestern deserts results in what we may very well describe as two springs, instead of spring and autumn. It is noteworthy, however, that the plants which develop into flower and fruitage after the summer rains are not in general the same as those which develop during the spring.

It is my purpose in this article to speak particularly of a plant which,

*Reprinted from *The Plant World*.

during the latter part of April and early May, supplies the dominant note of coloration in such regions as the desert about Tucson, Arizona. I refer to the palo verde, of which there are three species, known as *Parkinsonia microphylla*, *P. aculeata* and *P. Torreyana*. According to Sudworth's check list of forest trees of the United States,* the name *Cercidium Torreyanum* (Wats.) Sargent, is given to the last mentioned species, but for reasons of which I shall speak later it would hardly seem justifiable to separate generically *P. Torreyana* from the other two species.

I shall describe first the small leaved palo verde (*Parkinsonia microphylla*) (Fig. 23), which is found growing upon the rocky foothills of southern Arizona, California and Sonora, Mexico. This plant is as distinctly characteristic of this habitat as are the Giant cactus or Saguaro, the Ocotillo (*Fouquieria splendens*) and a considerable number of other plants, which in this connection need not be mentioned. It is a small, somewhat irregular tree, ten or twelve feet high, with more or less twisted and contorted limbs clothed with a green bark, this feature being common to all the species, and by which the name "palo verde" is very properly suggested, the name being Spanish for "green tree." The tree usually grows quite plentifully upon the stony hillsides, and in some places, at the time when other vegetation is less conspicuous than usual, has the aspect of a small apple tree, the whole formation looking rather orchard-like. During the early spring the smaller branches, which are lithe tapering twigs, are clothed with bipinnate leaves of a rather curious character. The single leaf has a very short rachis, so small indeed as to escape observation at first. From this spring two slender pinnae an inch or so long, which bear six or eight minute orbicular pinnules, scarcely an eighth of an inch in diameter. So small are the leaves that when they fall, as they

do during the latter part of April, very little difference is to be noted in the general aspect of the tree, although of course this will depend upon the density of the foliage, which varies with different individuals. The leaves, as is true of the Leguminosae in general, are capable of "sleep" movements, the leaflets of the third order folding together upwardly upon the approach of night. When the leaves wither and fall away the pinna as a whole separates from the main, though very small, rachis, the pinnules sometimes remaining attached but usually falling away separately. The tapering twigs are, when young, slightly pubescent and as they mature their ends develop into thorns. On account of the tapering form of the numerous twigs, and their whip-like flexibility, the tree has an exceedingly graceful form. Its delicate evergreen hue always gives its habitat a note of color, even during the driest seasons of the year when most, if not all, of the remaining vegetation has become more or less neutral in tint.

The flowers, which are borne in great numbers, are almost radially symmetrical, the only evidence that the flower is of the type of the Leguminosae being seen in the vexillum or upper petal, which is of a somewhat different form from the rest, being supplied with a longer claw, and white in color, while the rest are light, lemon yellow. The presence of the white petal is sufficient to modify the total color of the flower masses into a rather pale, greenish yellow, distinguishing it at once by this feature alone from the other species. The dorsiventrality of the flower is also marked by the unequal stamens and by their position, and also by the form of the pod, which of course is quite true to the family type. As soon as the insect life in the desert is set in motion by the rising sun the flowers are visited by myriads of insects of all kinds, so that as one stands near a tree their buzzing is very loud. The fruit, which

*Bulletin No. 17, U. S. Dept. of Agri culture, Division of Forestry, 1898.

develops rapidly during the early summer, consists of a papery pod bearing from one seed to a half dozen, each one of which is separated from its neighbor by a marked constriction of the pod, which at its outer end is continued into a slightly curved, rather long beak. The whole of the pod when ripe splits into two layers, the inner of which consists of a narrow strap of tissue which extends throughout the whole length of the pod, and is no wider at any point than is the constriction which occurs between the seed chambers. The outer layer, on the other hand, is the part which gives the form to the pod, and it will be seen therefore that during the ripening the inner layer or endocarp takes no part in the secondary enlargement of the pod, which accompanies the enlargement of the seeds. This feature distinguishes this species and *P. aculeata* from *P. Torreyana*, in which latter the whole pod develops without constricting between the seeds, and has a form very like that of an ordinary pea pod.

P. Torreyana, known also as the green-barked acacia, is a larger tree than *P. microphylla*, with, however, the same general habit of growth. save that the branches are somewhat less twisted and the terminal twigs longer. This tree grows in "washes," and apparently needs more water than its neighbor. It flowers very abundantly, the tree becoming a mass of brilliant yellow when in full bloom. The twigs are usually armed with short thorns, which are very short, leafless branches. The leaflets of this species are considerably larger, and the prominent petal, which in *P. microphylla* is white, is here yellow dotted with red, though slightly different in form from the rest of the petals. The pod of *P. Torreyana*, superficially regarded, differs materially from that of the other species, inasmuch, as above pointed out, there is no constriction between the seeds, or at any rate, very little, and this not constant. The ovary wall is papery, however, and while similar in general appearance to that of the common pea pod, differs

from it in the splitting of the outer and inner layers of the wall. In the region of the seed, where the pod has undergone a little further growth accompanying the growth of the seed, the inner layer, or endocarp, is found to have been arrested in its development, and so is not as wide as the ectocarp, and in this the plant is like the other species, differing from them only in degree. The non-adherence of the layers of tissue of the ovary wall results in a lack of tension which is to be found in many other species and which is related to the expulsion of the seeds, the setting free of which in these plants is accomplished by the mere splitting of the pod without any marked twisting of the fruit wall.

The third species, *P. aculeata*, is a still larger tree, confined to a somewhat narrower zone from Yuma, through northern Mexico to Texas. The nearest station to Tucson where it has been found by me is on the western slopes of the Baboquivari and Coyote Mountains, about seventy-five miles away to the southwest, although it may of course occur nearer. It is, like *P. Torreyana*, confined to the washes, which are the river beds, dry for the greater part of the year. When in flower it has much the appearance, too, of *P. Torreyana*, the flowers being wholly yellow with red markings on the upper petal, which turns brown with age. The pod is very similar in structure to that of *P. microphylla*. The most striking feature of *P. aculeata* is the leaf which conforms to the type described above for *P. microphylla*, but has two pairs of very much elongated pinnae, along the margins of which are inserted a few small, oblong leaflets, so small that they are scarcely noticeable at a short distance. The rachis becomes a sharp thorn, and on the rapidly growing shoots the stipules are also in the form of spines. The pinnae are green and strap-shaped and sometimes reach the length of one and a half feet and being persistent they give by their pendulous habit a graceful, willow-like form to the tree.

Another matter that is especially

worthy of note in this connection is the fact that plants of this genus are among the few Leguminosae the seeds of which are provided at maturity with an endosperm, and are therefore described in most systematic works as albuminous. This endosperm is reduced, in the ripened seed, to two horny, translucent layers parallel to the cotyledons, joined together by a small piece which forms a collar about the caulicle.

From the physiological point of view the green branches of plants in which the leaves are very much reduced, or absent, are so much leaf surface, just as in the cactus, which is entirely devoid of functional leaves, the green tissue supplies their want. Therefore we may regard the green bark of the palo verde as so much leaf surface. A transverse section cut through one of these twigs shows a highly organized system of green cells,

having an arrangement quite similar to that found in the leaves of many plants exposed to strong sunlight, as they are in the desert. The stomata are similar in type to those of many cacti, being immersed below the surface, each at the bottom of a pit. Although the twigs are slender and easily bent and so give readily to the wind, they are nevertheless very strong and tough, almost like strands of leather. This is accounted for by the presence of so-called bast, which in this plant is peculiar in that it traverses the pith longitudinally. This, however, is supplemented by similar strands found in the rind.

All three species are well worthy of cultivation, although I believe that the long-leaved species is the only one which has thus far been introduced into cultivation and is known throughout the most of the warm regions of the earth.

AMERICAN FORESTRY HONORED ABROAD

Forest Service Becomes a Member of the International Association of Forest Experiment Stations

THE Forest Service of the United States Government is to become a member of the International Association of Forest Experiment Stations. Other countries represented in the association are Germany, Austria, France, Italy, Russia, and Switzerland—the leading countries in the practise of scientific forestry. The purpose of the association is to standardize experimental work generally, so that the methods of investigation in each country will be uniform, and to collaborate in researches affecting two or more of the countries interested.

That the Forest Service should be able to enter this association on equal terms with the European countries through whose researches, conducted for many years, a science of forestry

has been built up is evidence of the rapid progress we are making in this science. Material development and the practical problems which it has presented have absorbed most of our energies, and our contribution to the world's progress along scientific lines has been in the field of invention and applied science rather than in discovery and research.

The science of forestry has until very lately been altogether foreign to us. It is hardly ten years since the first attempt to introduce scientific forestry upon American soil was made, and the opening of the Cornell School of Forestry in 1898 was a pioneer step in American education. Nor was it possible in this field to import a developed science and start abreast of Euro-

pean investigators by borrowing their results. Both the natural and the artificial conditions which determine forest utilization are so different from those found abroad that a new science had to be built up from its foundations.

Americans may well feel proud of the rapid progress made. That such results have been secured is primarily due to the liberality and foresight of Congress, which has steadily supported and provided for the work by increasing appropriations as success has been attained and capacity for expanding usefulness has been proved. The country is fortunate in the outcome, for it is now in position to utilize wisely one of its greatest resources and to do what may be done to avert the national peril threatened by forest destruction. We have now a science and practise of forestry based upon American conditions, and are ready to enter upon the stage of higher scientific research with the other nations represented in the International Association.

Affiliation with foreign workers will materially aid us on the way toward further goals. Better and better methods of practical management can be devised as knowledge of the underlying scientific problems becomes fuller. The United States will profit also through the criticism of its published results by the older and more experienced foresters of Europe, since a part of the plan of co-operation is the mutual exchange and discussion of forest publications. The conventions of the association will give opportunity for the discussion of international problems, for personal contact with foreign leaders, and for promoting the feeling of fellowship among workers in a common field which helps to draw the whole civilized world together.

Foreign forestry will profit from our investigations, because no other country has so wide a variation in climate or such a wealth of forest flora as America. As we advance in knowledge of silviculture we shall place at the disposal of Europe facts which

may well prove of importance for the management of European forests. New species will doubtless be made available for commercial use abroad, the vexed problem of the influence of forests on climate should be brought toward solution, and new methods of practise will be brought to light.

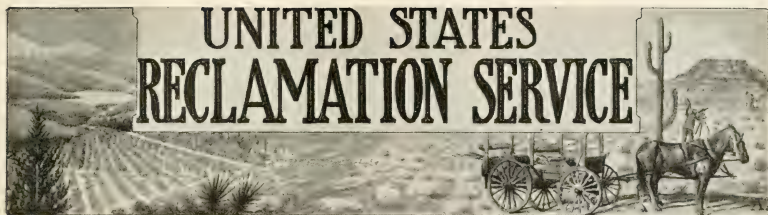
Official recognition of the progress achieved in experimental forestry in the United States was made in the invitation extended to the Forester by Dr. A. Bühler, Director of the Royal Württemberg Forest Testing Laboratory at Tübingen, Germany. In his letter Doctor Bühler said: "In inviting the United States to join the association I am but expressing the general desire. You have accomplished so much and have taken so capable a hold on investigations that the work of the association would be furthered by your membership."

The Forester's letter of acceptance, approved by the Secretary of Agriculture, is in part as follows:

"The Forest Service has always been deeply interested in the admirable work of the European experiment stations, which have been such an important factor in raising forestry from pure empirics to the position of a true science. Our own problems, though exceedingly vital to us, have until recently had only a limited, local interest, and for this reason I thought best to refrain from participating in the general scientific work of the International Association. Now, however, a number of wood-testing stations are well organized, other laboratory work is well under way, and the 127,000,000 acres of forest reserves with whose management the Forest Service is charged offer opportunities for many investigations which may contribute to the progress of our science.

"I shall therefore be very glad to have the Forest Service of the United States Department of Agriculture become a member of the International Association of Forest Experiment Stations, and promise as active participation in its work as circumstances will permit."

UNITED STATES RECLAMATION SERVICE



Government Irrigation Work During the Month

The Roosevelt Dam

A message was received at the office of the Reclamation Service December 14 stating that a flood carrying about 60,000 second feet of water had swept down upon the Roosevelt dam in Arizona. The contractor saved almost all of his machinery. Another report received the following day conveys the assurance that no actual damage to the dam itself was sustained, but that there would be a delay in the work of about a month in clearing out the pit.

Probably no engineering work in this country has attracted more attention than the construction of the Roosevelt dam, which is being erected by the Government in Salt River. The contractor, J. M. O'Rourke, of Galveston, Texas, laid the first stone of the dam on September 20, and the Government officials have watched with almost breathless interest as block by block the great curve of stone has steadily grown, and it is with a sense of relief news is received that the dam has reached a point where it can withstand with little damage the sudden floods which have repeatedly destroyed the works during the past year.

The dam will be 294 feet high and 800 feet long on top, and will form a lake 25 miles long with a capacity of 1,300,000 acre-feet. The work is progressing rapidly, and it is expected that water will be furnished for irrigation during the season of 1907, although the completion of the dam will require a much longer time. A brief summary of the work completed to

date shows that a power canal $19\frac{1}{2}$ miles long, with a drop of 220 feet is completed and furnishing power to operate the cement mill and for use in constructing the dam. Of tunnels 10,400 linear feet have been constructed, 40 bridges built, and 68 structures, such as headworks, flumes, and culverts, completed. A cement mill with a capacity of 350 barrels a day has been erected and 43,000 barrels of first class cement have been manufactured. The saw mill 30 miles up the canyon has cut about three million feet board measure of lumber for use in the various structures. One hundred and thirty-five miles of road have been built and about one hundred miles of telephone installed. The work so far accomplished involved the excavation of 975,000 cubic yards of material, the laying of 38,000 cubic yards of concrete, the driving of 20,000 linear feet of piling, and drilling and boring 3,560 feet. When completed the project will reclaim more than 200,000 acres of desert land.

Belle Fourche Work

Owing to the cold weather, work on the dam embankment, Belle Fourche irrigation project, South Dakota, has been discontinued and probably will not be taken up again before April. The total progress on this embankment to date is 219,000 cubic yards. The closing down of work on the dam made available a large force of men for other work. The men employed by different contractors, as well as those under the direct supervision of the Government engineers, have been

placed on canal excavation, finishing structures, etc., as soon as unfavorable weather made concrete and embankment work impossible.

In many respects this is one of the most remarkable irrigation projects yet undertaken by the overnment. It involves the construction of one of the greatest earth dams in the world, a structure over one mile long, 100 feet high in the highest place, and 90 feet wide on top. Its cubical contents will be nearly half those of the Pyramid of Cheops, which is estimated to have occupied 900 years in construction. The Belle Fourche dam will be completed in less than one year. This dam will create a reservoir 60 feet deep with a water surface of about 9,000 acres when full.

More than 1,000 new farms will be created by this project in a valley where the principal product has been low grade range cattle, and the value of lands which now ranges from \$5 to \$10 per acre will be increased to \$75 and upwards.

With assured forage crops the ranchmen can greatly increase their herds, and with winter feed the quality will be materially improved and the prices correspondingly better. Small grains such as oats, wheat, rye and barley, and such fruits as apples, pears, plums, cherries and small fruits can be raised. Sugar beets will also probably prove a profitable crop. The demand for farm and garden products is great on account of the proximity of the mining regions of the Black Hills. The mining industry will undoubtedly undergo a fresh boom, as food supplies at a reasonable price and increased transportation facilities make the working of low grade ore profitable.

New lines of railroad are already being built which will connect this valley with Minnesota's Twin Cities, and already the population of Belle Fourche has more than doubled.

The Government officials hope to be able to furnish water for about 10,000 acres during the season of 1907.

Gunnison Tunnel

The engineer in charge of operations on Gunnison Tunnel, Uncompahgre irrigation project, Colorado, reports that 17,374 feet were completed December 1, and nearly a mile of masonry floor was laid in the west end.

The progress on tunnel work during November was 586 feet, less than that made any previous month. This falling off was due to the unusual difficulties encountered. In the east end the material is quartzite of such a degree of hardness that it is very difficult to drill. In the west end the strata changed several times, necessitating change of tools. Men who were experts with coal augurs, for instance, had scarcely any knowledge of piston drills. A great deal of pumping was necessary to remove the water which came into the headings. Experienced drillmen are very scarce. Wages are high, but the unusual activity in the mining industry makes it difficult to secure assistance.

It is believed that better progress will be made during the present month. Canal work is being pushed as rapidly as possible in order that when the tunnel is completed the distributing system will be ready to carry the water over the land. It is expected that the tunnel will be ready for operation in June, 1908.

Floods do Little Damage

The recent unusual and unprecedented floods in the Cascade Mountains, in Washington, did but little damage to the works of the United States Reclamation Service. The principal damage was to the roads which had been constructed to take in the heavy machinery, and the total loss will probably not exceed \$10,000. The dams being constructed at the mouths of several lakes were but little injured, while the large dam in the Yakima River was not injured at all.

The Government was exceedingly fortunate, as the flood which came down the Yakima Valley, was the largest ever known in the history of the country, and caused the loss of

property probably in excess of half a million dollars. The railroads and power companies were the principal losers. A great deal of farming property was flooded. It is not expected that the flood will cause any serious loss of time in the progress of the Government's construction work in the Yakima Valley.

Advertising for Bids

The Secretary of the Interior is advertising for proposals for the construction of the diversion dam and headworks, in connection with the

This work was previously advertised and but one bid received, and that for only part of the work. The Secretary of the Interior rejected this bid as being excessive, and authorized the prosecution by force account of certain work near the headgates, which was necessary in order that water may be delivered in the spring of 1907.

The Secretary of the Interior is also advertising for proposals for furnishing steel and cast iron for use on the North Platte irrigation project, Nebraska. The bids will be opened at



Initiating a recent recruit into the mysteries of irrigation engineering

North Platte irrigation project, Wyoming-Nebraska.

The work involves the excavation of about 90,000 cubic yards of earth and rock, furnishing and placing in structures about 10,000 feet board measure of lumber, and the construction of about 8,000 cubic yards of concrete masonry.

The bids will be opened at Mitchell, Nebr., January 9, 1907.

Mitchell, Nebr., January 24, 1907.

About 125,000 pounds of steel bars for reinforcement of concrete, about 16,000 pounds of structural steel, and about 50,000 pounds of cast iron gates, guides, stands, etc., are required.

Work by Force Account

The Secretary of the Interior has also granted authority to the Reclamation Service to construct by force

account a canal approximately three miles in length, to be used in connection with the power plant to be constructed for the generation of electricity at the mouth of Spanish Fork River, Strawberry Valley irrigation project, Utah.

Owing to the fact that no bids were received for the construction of a dam at the outlet of Bumping Lake, Washington, in connection with the Yakima irrigation project, the Reclamation Service asked authority for the construction of this work by force account, and same has just been granted by the Secretary of the Interior.

As the point where this work is to be done is very remote from the railroad, the work evidently was not attractive to contractors. As there seems to be no probability that readvertising would result in receiving bids, and it being certain that such readvertising would cause the loss of an entire season, it is extremely important that the work should begin at once by force account. The estimated cost of the structure is about \$140,000.

Piper Bros., of Pueblo, Colo., contractors in charge of canal construction on the Huntley irrigation project, Montana, have formally transferred to the Reclamation Service their contract, plant, material, supplies and commissary. The Government will complete the contract by force account, and has already organized a force and work is under way.

Extension of Time

The Secretary of the Interior has granted an extension of 60 days time to the Canton Bridge Company, of Canton, Ohio, for the construction of five highway bridges over the main supply canal, Belle Fourche irrigation project, South Dakota. The contractors were delayed by the failure of the manufacturing companies to promptly deliver the structural materials.

An extension of time to June 1, 1907, has been granted to William D. Lovell, of Minneapolis, Minn., for the completion of Division 2, main canal,

Huntley irrigation project, Montana.

Owing to the unusual floods which have occurred on the western side of the Cascades, and which practically suspended railroad traffic for a time, rendering it impossible for contractors to present bids on the date fixed, the Secretary of the Interior has extended the time of opening bids on the main canal of the Tieton project and on the dam on Bumping Lake.

Contracts Awarded

The Secretary of the Interior has awarded a contract to the Midland Bridge Company, of Kansas City, Mo., for furnishing steel and cast iron for reinforcement and structural uses in connection with the Rio Grande irrigation project, New Mexico.

The contract calls for 55,000 pounds of steel bars for reinforcement of concrete, about 12,800 pounds of structural steel, and about 9,000 pounds of cast iron gates, guides, and stands to be delivered within 60 days after award of contract. The bid of the Midland Bridge Company was \$2,885.

A board of consulting engineers of the Reclamation Service recently convened in Portland, Ore., to open bids for the construction of about twelve miles of main canal in Tieton Canyon near North Yakima, Wash., with diverting dam, headworks, tunnels and other appurtenant structures, received but one proposal. This was submitted by Mr. Theodore Weisberger, of North Yakima, Wash., for the work of Schedules 5-A, 6-A, and 7-A.

The Secretary of the Interior has awarded Schedules 6-A and 7-A to Mr. Weisberger, and authorized the construction of Schedules 1-A, 2-A, 3-A, 4-A, and 5-A by force account.

Mr. Weisberger's contract amounts to \$230,381.10, and calls for the furnishing, distributing, and laying of concrete shapes in open canal, flumes and tunnels.

The Secretary of the Interior has executed a contract on behalf of the United States and approved the bond of the Kansas Portland Cement Company, of Iola, Kans., for furnishing

5,000 barrels of Portland cement for the Garden City irrigation project, Kansas. This cement is to be furnished for \$1.60 per barrel, f. o. b. cars at Iola.

A contract on behalf of the United States has been executed and the bond of Nels L. Olson, of Butte, Mont., approved for the construction of Division 1, Garland canal, Shoshone irrigation project, Wyoming. This work involves the excavation of about 600,000 cubic yards of earth, about 96,000 cubic yards of rock and shale, and the construction of incidental structures about 15 miles northeast of Cody, Wyo. Mr. Olson's bid was \$270,746.60.

The Reclamation Service has purchased two lots in the town of North

Yakima, Wash., upon which it proposes to erect an office building in connection with the Yakima project.

In order to expedite work on the Milk River irrigation project, Montana, the Secretary of the Treasury has appointed L. R. Stockton, assistant engineer in the Reclamation Service at Browning, Mont., inspector of customs, without compensation, to be under the direction of the collector of customs at Great Falls, Mont.

Town Water Supply

The Reclamation Service has formally released three cubic feet of water per second of time, from the Clealum River, for the use of the town of Clealum, Wash., and its inhabitants for domestic and municipal purposes.

MEETINGS OF THE SOCIETY OF AMERICAN FORESTERS

TWO very interesting meetings of the Society of American Foresters were held on the evenings of December 6 and 13, at the home of the president, Mr. Gifford Pinchot, 1615 Rhode Island avenue, Washington. On the earlier date Inspector E. T. Allen presented a paper on "How to Make Forest Reserve Work Attractive."

Mr. Allen showed the importance and value of the supervisors and rangers' meetings, inaugurated the past year, to afford opportunity for exchange of experience and a chance to learn more of technical and office methods.

Mr. Allen said: "The average supervisor is charged with the administration of 2,000,000 acres, worth intrinsically \$6,000,000, and as a protector of public interests worth many times more. He should be not only an administrator, merchant, and lawyer, but stockman, miner, lumberman, and forester, and these suggest only a few of his technical requirements, without considering the general strength and integrity which go with such a respon-

sible position. I do not think it is too much to say that in private business a man actually competent to fill it, would be considered cheap at \$5,000 a year."

On December 13 the subjects, "Brush Burning as a Protective and Silvicultural Measure," by Mr. Thos. H. Sherrard, in charge of Forest Management in the Forest Service, and "Forest Conditions in Southeastern Alaska," by Supervisor W. A. Langille, engaged the attention of the foresters.

What is the best disposition of debris after lumbering is a *burning* question because the reproduction of the best trees and therefore both the perpetuity and improvement of the forest depend so largely on the adaptation of logging methods to the silvicultural requirements of the trees which should form the future stand. The differences in conditions—character of the trees, climate, soil, extent of grazing, etc.—make it impossible to prescribe set rules for the disposition of slash. Mr. Sherrard spoke from his own wide experience and read extracts from let-

ters received from forest officers in charge of the reserves. From the letters and the discussion it appeared that the lopping of tops and cleaning up debris following lumbering is a necessary measure, both as a precaution against fire and to encourage reproduction. In insect-infested timber, brush should be burned at the proper season to destroy the young pests which harbor in the branches. In the lodgepole pine regions burning is usually advisable, choosing seasonable times when the danger of losing control of the fires is least. In the Pacific Northwest brush can be burned, by carefully raking it away from the seed trees, without piling. In California piling is essential. In Arizona and New Mexico and elsewhere brush, in many cases, should be thrown in gullies to stop further erosion, and it is also useful in protecting seedlings from stock. In Colorado and Utah brush is often an aid to reproduction in conserving moisture and as a protection from the sunlight.

Where careful removal of the slash is required it is observed that lumbermen more fully utilize the material contained in the tops, cutting about two feet farther into the crown of the tree. Where the tops are piled for future burning from six to seven per cent of the ground is occupied by the piles. If, in the winter, burning proceeds along with lumbering, the area thus occupied may be reduced to 2 per cent, and teams and mechanical appliances can be more easily handled when the brush is out of the way.

Mr. Langille, who is in charge of the Alaskan forest reserves, covering an area of 6,000,000 acres, chiefly islands, in southeastern Alaska, gave an interesting description of the tree species, physiography, and lumbering methods of that region. The islands range from three to four thousand feet high, the drainage basins are short, with scarcely any valleys, and with the excessive precipitation much

of the organic soil is swept into the sea as it is formed. Consequently road building over the rocks is difficult. Animals are scarce; there are probably not over twelve cows and five horses within the reserves, and but three horses and one mule in Ketchikan. Coal imported at \$6 a ton is cheaper than the cost of cutting standing timber, but in cases the natives depend upon drift logs for fuel.

However, a large amount of valuable timber awaits increased demand, and along the beach timber sales are increasing rapidly. Sixty to sixty-five per cent of the timber is western and black hemlock; 20 per cent is Sitka spruce, and this at present forms nearly the whole of the logging trade; the balance is red and yellow cedar and jack pine. Hemlock attains a maximum diameter of four feet, but its weight endangers transportation by water 30 to 150 miles to the mills at Juneau and Douglas. Rafts of spruce logs averaging 767 board feet or of trees averaging 4,000 feet are common. Trees of 3 feet diameter are those ordinarily cut, and those reaching 9 feet and towering to a height of over 200 feet are found.

Government stumpage is 50 cents per thousand; logging costs \$4.50 per thousand; towage, \$1 to \$2 per thousand. The lumber brings—\$12 for common, \$17 to \$20 for dimension, and \$25 for finishing. Sixty per cent of the best grades goes into salmon cases, and there is a demand at Seattle for clear spruce for counter tops and shelving, and for fruit and berry boxes, for which being odorless and free from resin, it is well suited.

Mr. Langille has found much difficulty in securing transportation by water to the various portions of the reserves, and inspection of the lumbering jobs, some of them 60 miles apart, will be greatly facilitated by the use of a new 60-foot gasoline launch, the purchase of which has recently been authorized.

FORESTRY IN COLORADO—SOME RECENT PROGRESS

BY

W. G. M. STONE

President Colorado State Forestry Association

WHEN Colorado was first settled "the woods" were free for all and for forty years our chief interest in forestry appeared to be to destroy, nor did we seem to care particularly how much forest burned. At any rate no direct, rational attempt was made to save the forests. So thoughtless and reckless were we that scarcely less

against the reserves as anybody, both in Congress and out, contributing fuel to the fire of opposition which, at first, was never too low to burn.

But the leaven of reform, in the public mind, was working, and the last two or three years have witnessed remarkable changes in both public sentiment and forestry conditions, so that



View Showing Result of Repeated Fires in Colorado Forests

than 25,000 square miles of forests were permitted to be swept from our mountain sides.

Soon after the passage of the act authorizing the forest reserves there were nearly 3,000,000 acres set apart for this purpose. For a decade little was done except to curse the law and curse the reserves. Some of our own senators and congressmen were as bitter

forestry in Colorado, in the language of Samuel Kirkham, is "marching onward with gigantic strides."

Within two years there have been added to the forest reserves of the state nearly 10,000,000 acres. The State Agricultural Experiment Station has established forty-nine experiments in tree-planting in different parts of the state, employing 30,900

utility trees—black locust and hardy catalpa. Also by the munificence of General Palmer and Dr. Bell a forestry school has been established in Colorado College, at Colorado Springs. Within three years the forestry sentiment has developed so rapidly that the State Agricultural College has added "forestry" to the program of subjects in farmers' institute work, and will open a Short Course in Forestry for the second half of February, to be presided over by Prof. H. P. Baker, of Ames, Iowa; and if sufficient funds can be found available the State Agricultural College will establish a Department of Forestry the coming year.

The State Federation of Womens' Clubs has taken up forestry as a subject of study during the last two years. A Forestry Section has been thoroughly organized and is doing able and admirable work, one very remarkable feature of which has been the discovery and development of one of the

most successful and aggressive lecturers on forestry the country has known, Mr. Enos A. Mills, of Estes Park, Colo., who recently competed a two months' tour from Pueblo, Colo., to Boston, filling fifty appointments, many of them of unusual importance, is a striking incident in the progress of forestry.

Then, too, the Colorado State Forestry Association is to the front with an appeal to the approaching General Assembly for a radical revision of the forestry laws, asking for a Board of Forestry, a State Forester, a state nursery and various other important things which if put on our statute books will mark a notable era in the progress of forestry in Colorado. Impatient as many of us are to see more things done, a careful survey of the situation reveals a degree of progress that to the reflective mind is gratifying in the extreme.

HAS AUTHORITY, BUT NO MONEY

**Minnesota State Forestry Board Needs an Appropriation—
Legislature Will Be Asked to Provide Funds for Carrying Out Law of 1903 Relating to Forest Reserves**

THE Minnesota State Forestry Board, at its meeting in the capitol December 11, decided to recommend an annual appropriation of \$25,000 for carrying out the provisions of the law of 1903, which authorized the board to purchase certain lands for forest reserves but for which no appropriation has been made. The board will recommend also that an examination of the remaining vacant land be made for the purpose of ascertaining what tracts would be suitable only for forestry, with a view to having such lands used for forestry purposes.

The report, in part, follows:

"On the Pillsbury reserve, in Cass county, the board has established a nursery now containing the estimated

number of about 700,000 evergreen seedlings, principally Norway spruce, and each has cost to date not exceeding one mill apiece. They will be three years old next spring, and being now crowded ought then to be planted. There are enough to plant 250 acres, and as much of the land is somewhat brushy and the spots for planting require little clearing, the expense of planting probably will average \$10 per acre. There should, therefore, be an appropriation of \$2,500, to be available next spring, to do this planting. There are now five pulp paper mills in Minnesota, and it is believed the experiment of growing spruce on this Pillsbury reserve for paper pulp will prove valuable.

IMPORTS PINE SEEDLINGS.

"In the spring of 1906 the board imported from Germany and had planted on the Pillsbury reserve 20,000 white pine seedlings two years old. They were received well packed in moss and heather and cost at the reserve $\frac{1}{2}$ cent each. As there was some doubt of their being in a perfectly fresh condition they were planted four in a spot, the spots four feet apart, where the ground was bare, and in brush two in a spot, the spots six feet apart. There were enough, therefore, to plant only six and a half acres. In October last they were found to be almost all of them in a thrifty condition.

"During July, August and September of 1905 an examination of the so-called Burntside forest, being the 20,000 acres granted to the state for forestry purposes by act of Congress, April 28, 1904, was made for the state by T. L. Duncan, of Northome, with the aid of three assistants, and a forest working plan for the tract has been published. A number of government stakes ought to be restored on this land, a nursery started, some buildings erected, trails—and if possible roads—opened. The board regards any money well spent on this or any reserve as an investment.

ASK ANNUAL APPROPRIATION.

"The law of 1903 authorized the

Forestry Board to purchase for forest reserves at not exceeding \$2.50 per acre land adapted for forestry, but not to exceed in any one township one-eighth of the area thereof. No money has been appropriated to carry the law into effect, and we recommend an appropriation of not less than \$25,000 annually to make the law effective.

"We recommend that provision be made for the examination by experienced and competent land examiners of the remaining vacant public lands of the United States within this state, a portion of which are supposed to be adapted for forestry, for the purpose of ascertaining what tracts therein will be available for agriculture and what tracts would be only suitable for forestry, with a view of having the forestry lands, if any, turned over to the state or administered by the United States Government for forestry purposes.

"The undersigned believe the time has come when reforestation should be undertaken by the state in a business-like manner and on a larger scale than at present, and that it would be wise to make a suitable beginning during this period of prosperity."

The board is composed of the following members: S. M. Owen, president; C. C. Andrews, secretary; A. C. Wedge, M. M. Williams, Samuel B. Green, F. Weyerhaeuser, and W. B. Douglas.

GRAZING FEES WILL BE COLLECTED ON RESERVES

Regulations Unmodified by Recent Decision of Federal Judge — Misapprehension Corrected

A RECENT decision of a federal judge has been widely commented upon throughout the West on the supposition that it declared illegal the regulation of grazing on forest reserves and the system of charging for grazing permits. As a matter of fact,

the decision, which was handed down by Judge Whitson, of the United States District Court for eastern Washington, in the case of the United States *vs.* Matthews, has no bearing whatever upon the legality of the grazing regulations or of grazing fees, which

stand precisely as before. The legal question involved was simply this: Does the law authorizing the Secretary of Agriculture to issue regulations make the breach of those regulations a crime?

Judge Whitson's decision merely answered this question "No." It was in substance that the objection to the indictment against Walter Matthews was the absence of a law defining the act therein charged as a criminal offense. Upon that ground the court held that the demurrer must be sustained and the defendant discharged.

Though the point was simple and clear enough, it was entirely misconstrued in the press reports of the decision and in editorial comments upon it. For instance, in the *Wyoming Tribune* of Tuesday, November 6, news of Judge Whitson's action was given under the headlines: "Grazing Fees Illegal Decides Federal Judge," and the article declares that, "As a result of the decision, Matthews, who entered the Mount Rainier Forest Reserve without the permit required by the Secretary, is still using the reserve and is not paying the fee imposed by the Secretary." As a matter of fact, Mr. Matthews's sheep were immediately removed upon notice by the forest officers and have not since entered the reserve.

In the Sheridan, Wyo., *Post* it is said: "A decision fraught with importance to Wyoming stockmen is that appearing in this issue, wherein it is held by the United States District Court that the collection of fees for grazing live stock is illegal. * * * Since its imposition this fee has been regarded as illegal and arbitrary by many well-informed Wyoming people, and the views expressed by the court in this decision meet with general approval here. * * * The litigant is still running his sheep on the Rainer Reserve without paying the fees."

Decisions like Judge Whitson's had before been made by the federal courts in three other districts, one of them six years ago, but none of these interferes in the slightest with the right of

the United States to institute civil action against trespassers violating the grazing regulations, or with charging the grazing fee. The United States Circuit Court of Appeals for the Ninth Circuit decided definitely, in the case of *Dastervignes vs. United States*, that the provisions of the act of March 4, 1897, delegating to the Secretary the power to make regulations, is constitutional, that the regulation prohibiting the pasturing of sheep on forest reserves without a permit is valid, and that the federal courts will enforce the regulation by injunction. The Supreme Court of Arizona, three judges sitting, in the case of *Dent vs. United States* (76 Pacific Reporter, 455), went still further, under circumstances which made the decision most emphatic. Dent was criminally prosecuted for grazing sheep on a forest reserve without a permit, in violation of the regulations, and the court had held that his act was not a crime; but as soon as the *Dastervignes* case was decided for the Government the Arizona court granted a rehearing of the *Dent* case and held that the *Dastervignes* decision was binding on all courts in the Ninth Circuit in criminal as well as civil cases, and that *Dent* was therefore guilty of a crime.

So far, therefore, the court decisions as to the criminality of trespass contrary to the forest-reserve regulations are conflicting. Final adjudication of the point can not be had until the ruling of a higher court has been secured; but no court has questioned the right of the Secretary of Agriculture to make regulations and to recover damages for trespass through civil action.

Grazing trespassers will be restrained from violation of the regulations by injunction proceedings and sued for civil damages until the higher courts shall have reached a decision as to the criminal character of such trespasses. The Forest Service will continue to exclude unpermitted stock from all forest reserves and to collect grazing fees for all stock under permit.

RECENT PUBLICATIONS

In Forest Land. By Douglas Malloch. Cloth, gilt top, illustrated in tint, \$1.25 a copy. American Lumberman, 315 Dearborn street, Chicago.

Among recent offerings of the publishers appears a new book of poems by a new author and, very happily, with a new theme. It is "In Forest Land," by Douglas Malloch, and it celebrates in verse for the first time a character rugged and appealing, the "lumberjack," as the woodsmen is colloquially known. The forest, its beauties, its people and its utilities are the author's all-pervading thought, and into the forest and of the forest he has woven more than a hundred poems whose originality is striking.

There is nothing obscure about Mr. Malloch's verse. He apparently has written for the great public heart, confident that his field is new, his knowledge exact and his inspiration genuine. When he speaks his faith, he does it simply. When he is humorous, it is the humor of good cheer. When he is philosophical, his philosophy is flecked with sunshine just as are the pathways of his delightful woods.

It is safe to say that many readers who have not known Douglas Malloch in the past will extend a welcome to him in the future. Here is a young man who has dedicated his genius and his best efforts to writing of a region in which the public feels an affectionate interest.

There are men to whom the forest is a home and an occupation. They come into contact with the outer world but little. But their labors and their environment give them nobility and picturesqueness. These the author of "In Forest Land" has portrayed with feeling and success. He has given to us a character almost unknown to literature and has put into that character's mouth a delightful philosophy, a quaint humor and simple and yet heroic ideals. Its vivid interest makes "In Forest Land" deserve to rank at once with the season's best literary offerings.

The forest, the lumber camp the saw mill, the deck of the lumber schooner, and the river—these are the places to which Mr. Malloch has gone in search of his material, and he has given to the world a little volume which will rank among the best books of the year, not merely because of its literary merit, but because it strikes a new note in American poetry. He has brought home to us not only the forest with its peaceful calm and inspiring beauty, but he has taken us into the recesses of the wood and set us down among the swamps and skidders and opened up a mine of ingenuous sentiment.

Camp Fires in Canadian Rockies. By William T. Hornaday, Sc. D. With illustrations and maps. New York: Chas. Scribner's Sons. Price, \$3 net.

Two men of very different kinds are combined in Dr. William T. Hornaday, whose "Camp Fires in the Canadian Rockies" has just been published. One is the accurate, careful, patient and trained observer of all the phenomena of nature, animate or inanimate, whose wide knowledge of animals and their habits made him the man best suited for the directorship of the New York Zoological Park. The other is the buoyant, breezy, unconventional lover of outdoor life and adventure, with a positive genius as a story-teller, the master of a style of narrative as fresh and racy as the winds which blow through the forests and across the snow-clad slopes of the mountains that form the scene of his new book. Pedestary and dry-as-dust facts have never been welcome at Mr. Hornaday's library table, and the result is that they are happily absent from his books. And yet one is subtly conscious that the whole superstructure of his narrative of his experiences, observations and adventures, however familiar, light-hearted and even gayly humorous the form may be, rests upon a foundation as sound and as true as abundant scientific knowledge can make it.

In the preface to "Camp Fires in the Canadian Rockies," Dr. Hornaday, with his accustomed modesty, declares that his book "is merely a story of recreations with big game, with a few notes on nature." Next, he says, to the necessity growing out of the state of his health, of a strenuous trip into mountain wilds, his chief object was to get into the home of the mountain goat and to learn at first hand something of the strange personality of that remarkable animal. With characteristic generosity, Dr. Hornaday goes on to say that the most valuable result of the trip was the collection of photographs of a live mountain goat secured by his campmate, John M. Phillips, of Pittsburg, at risks to life and limb that few photographers would take. Mr. Phillips, however, was no ordinary photographer. "True sportsman, game protector (his vocation is Pennsylvania Game Commissioner), mountaineer, photographer, and genial gentleman, all in one"—that is Dr. Hornaday's portrait of his companion during the two months which they, with several guides, spent in the mountains of British Columbia. And certainly the collection of photographs which Mr. Phillips brought out of the wilderness, and which, to the number of more than three score, are used to illustrate Mr. Hornaday's spirited narrative, has never, we believe, been equaled.

A Few Points on Automatic Water Supplies for Irrigation, Mining and Town Water

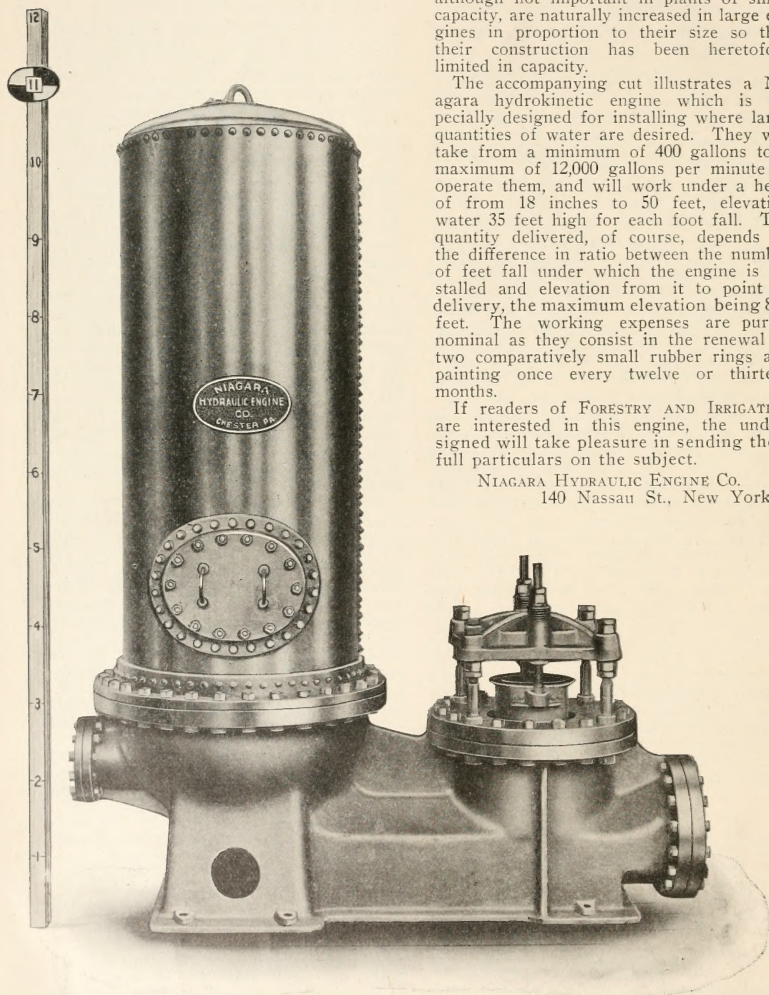
Notwithstanding that a properly constructed and installed hydraulic ram has the highest efficiency for converting a given hydraulic power into work, in the way of automatically elevating water to a height considerably greater than the fall from point

of intake to location of engine, yet, this device is often overlooked when considering the problem of an economic and dependable water supply. This is probably due to the fact that the ordinary hydraulic rams possess certain defects in construction, which, although not important in plants of small capacity, are naturally increased in large engines in proportion to their size so that their construction has been heretofore limited in capacity.

The accompanying cut illustrates a Niagara hydrokinetic engine which is especially designed for installing where large quantities of water are desired. They will take from a minimum of 400 gallons to a maximum of 12,000 gallons per minute to operate them, and will work under a head of from 18 inches to 50 feet, elevating water 35 feet high for each foot fall. The quantity delivered, of course, depends on the difference in ratio between the number of feet fall under which the engine is installed and elevation from it to point of delivery, the maximum elevation being 800 feet. The working expenses are purely nominal as they consist in the renewal of two comparatively small rubber rings and painting once every twelve or thirteen months.

If readers of FORESTRY AND IRRIGATION are interested in this engine, the undersigned will take pleasure in sending them full particulars on the subject.

NIAGARA HYDRAULIC ENGINE CO.
140 Nassau St., New York.



View of a Niagara Hydrokinetic Engine

